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TABLE OF CONTENTS

ARTICLES

E. W. AMEN
An Experimental Investigation of the Experience which accompanies the Sudden Cessation of an Auditory Stimulus 263

W. A. ANDREWS
Haptical Illusions of Movement 277

A. S. BAKER
On the Non-Visual Perception of the Length of Horizontally Whipped Rods 139

I. BERSHANSKY
The Areal and Punctiform Integration of Warmth and Pressure 584

R. CARPENTER
Laughter, a Glory in Sanity 419

L. W. COBBEY and A. H. SULLIVAN
An Experimental Study of the Perception of Oiliness . . 121

C. COMSTOCK and H. KITTEREDGE
An Experimental Study of Children as Observers . . . 161

T. D. CUTSFORTH and R. H. WHEELER
Synaesthesia and Meaning 361

F. L. DIMMICK
A Note on Henning's Smell Series 423

M. E. ELLIOTT
Comparative Cognitive Reaction-time with Lights of Different Spectral Character and at Different Intensities of Illumination 97

H. B. ENGLISH
An Experimental Study of Certain Initial Phases of Abstraction 305

S. FELDMAN and E. B. TITCHENER
A Bibliography of the Scientific Writings of Wilhelm Wundt 260

J. M. FLETCHER
The Miracle Man of New Orleans 113

C. H. GRIFFITTS
Affirmation and Negation 84

M. GUERNSEY
A Study of Liminal Sound Intensities and the Application of Weber's Law to Tones of Different Pitch 554

H. M. HALVERSON
Binaural Localization of Tones as Dependent upon Differences of Phase and Intensity 178

H. M. HALVERSON
Diotic Tonal Volumes as a Function of Difference of Phase 526

L. B. HOISINGTON
A Table for the Graphic Check of the Method of Constant Stimuli 244

J. R. KANTOR
Can the Psychophysical Experiment reconcile Introspectionists and Objectivists? 481

J. R. KANTOR
The Psychology of Reflex Action 19

H. KITTEREDGE and C. COMSTOCK
An Experimental Study of Children as Observers . . 161

L. KNIGHT
The Integration of Warmth and Pain 588

H. C. LINK
Instinct and Value 1

H. M. LUFKIN
Cutaneous Localization and the "Attribute of Order" . . 128

M. K. MACDONALD
An Experimental Study of Henning's System of Olfactory Qualities 535

M. T. MACDONALD, M. F. WASHBURN and D. VAN ALSTYNE
Voluntarily Controlled Likes and Dislikes of Color Combinations 426

M. F. MARTIN
Film, Surface, and Bulky Colors and their Intermediates 451

E. F. MÖLLER
Intensity and Upper Limen of Hearing 570

C. MOXON
The Influence of Creative Desire upon the Argument for Immortality 255

R. M. OGDEN
Are there any Sensations? 247

R. M. SIMPSON
Creative Imagination 234

ERNA SHULTS
On the Non-Visual Perception of the Length of Vertically Whipped Rods 135

H. E. STARR
The Hydrogen Ion Concentration of the Mixed Saliva considered as an Index of Fatigue and of Emotional Excitation, and Applied to a Study of the Metabolic Etiology of Stammering 394

A. H. SULLIVAN and L. W. COBBEY
An Experimental Study of the Perception of Oiliness . . 121

M. A. TINKER
Distracted Motor Performance 578

E. B. TITCHENER
Functional Psychology and the Psychology of Act, II . . 43

E. B. TITCHENER
Mach's "Lectures on Psychophysics" 213

E. B. TITCHENER and S. FELDMAN
A Bibliography of the Scientific Writings of Wilhelm Wundt 260

W. A. THALMAN
The After-effect of Movement in the Sense of Touch . . 268

D. Van Alstyne, M. F. Washburn and M. T. Macdonald
Voluntarily Controlled Likes and Dislikes of Color Combinations 426

M. F. Washburn, M. T. Macdonald and D. Van Alstyne
Voluntarily Controlled Likes and Dislikes of Color Combinations 426

R. H. Wheeler
The Development of Meaning 223

R. H. Wheeler and T. D. Cutsforth
Synaesthesia and Meaning 361

P. T. Young
Movements of Pursuit and Avoidance as Expressions of Simple Feeling 511

P. T. Young
Series of Difference Tones obtained from Tunable Bars . 385

Book Reviews

L. A. Averill, Psychology for Normal Schools (H. G. Bishop) . . 153
A. E. Avey, Readings in Philosophy 300
B. T. Baldwin, The Physical Growth of Children from Birth to Maturity (L. B. Hoisington) 296
A. J. Balfour, A Defence of Philosophic Doubt, Being an Essay on the Foundations of Belief 299
C. Baudouin, Suggestion and Autosuggestion (M. F. Washburn) . 150
J. W. Bridges, An Outline of Abnormal Psychology . . . 299
C. M. Child, The Origin and Development of the Nervous System from a Physiological Viewpoint (S. Simpson) 294
J. L. Des Bancels, Introduction à la psychologie: l' instinct et l'émotion 299
B. Erdmann, Grundzüge der Reproduktions-Psychologie (R. Dodge) 292
J. C. M. Garnett, Education and World Citizenship (R. H. Jordan) 442
G. S. Hall, Senescence, The Last Half of Life (J. Morse) . . 591
H. E. Hering, Fünf Reden von Ewald Hering (E.B.T.) . . 295
J. M. Keynes, A Treatise on Probability (W. S. Foster) . . 439
K. Koffka, Die Grundlagen der psychischen Entwicklung (R. M. Ogden) 435
O. Kuelpe, Vorlesungen über Psychologie (R. M. Odgen) . . 144
G. F. Lipps, Grundriss der Psychophysik 298
S. Paton, Human Behavior in its Relation to the Study of Educational, Social and Ethical Problems (E. C. S.) . . . 429
L. Pound, Poetic Origins and the Ballad (H. G. Bishop) . . 298
W. R. Wells, The Biological Foundations of Belief (L. B. Hoisington) 152
R. S. Woodworth, Psychology: A Study of Mental Life (K.M.D.) 430
W. Wundt, Elements of Folk Psychology: Outlines of a Psychological History of the Development of Mankind (E. B. T.) . 150

Some Recent Psychoanalytic Literature (G. Stanley Hall)

L. Dooley, A Psychoanalytic Study of Manic-Depressive States . 288
D. O. Edson, Getting What We Want 290

S. Ferenczki, K. Abraham, E. Simmel, and E. Jones, Psychoanalysis and the War Neuroses 287
S. Freud, A Young Girl's Diary 285
S. Freud, Dream Psychology 289
J. A. Jackson and H. M. Salisbury, Outwitting Our Nerves: A Primer of Psychotherapy 291
W. Lay, Man's Unconscious Spirit 290
R. Macaulay, Dangerous Ages 289
A. G. Tansley, The New Psychology and its Relations to Life . 286
J. Varendonck, The Psychology of Day-dreams 286

PSYCHOLOGICAL PERIODICALS

Arch. f. d. ges. Psychologie 300, 445, 446, 447
Psychological Review 448
Zeits. f. Psychologie 301, 445

NOTES

Affirmation and Negation (J. S. Moore) 449
Appointments 450
Edinburgh Meeting of the British Association (H. S. Langfeld) . 158
Elements of Folk Psychology (E. B. T.) 450
An Emendation (E. B. T.) 599
Benno Erdman (R. Dodge) 155
Erratum 602
Experimental Psychology in the Talmud (S. Feldman) . . 304
Festschrift for Carl Stumpf (E. B. T.) 157
Physical Growth of Children (B. T. Baldwin) 449
Plethysmographic Technique (S. W. Fernberger) 449
Psychological Periodical, A New 601
Serial Exposition of Wall-Charts (H. G. Bishop) 600
Synaesthesia in a Child of Three and a Half Years (A. K. Whitchurch) 302
Titchener Commemorative Volume 601
Urban's Tables Again (E. G. B.) 303
Urban's Tables Yet Again 450
Augustus Désiré Waller(E. B. T.) 450
The Max Klinger Bust of Wundt (E. B. T.) 304

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INSTINCT AND VALUE*

By HENRY C. LINK

"We may say, then, that directly or indirectly the instincts are the prime movers of all human activity. The instinctive impulses determine the ends of all activities and supply the driving power by which all mental activities are sustained; and all the complex intellectual apparatus of the most highly developed mind is but a means towards these ends, is but the instrument by which these impulses seek their satisfaction,—and in them we are confronted with the central mystery of life and mind and will."
W. McDougall, "Social Psychology," 44.

When, many years ago, Bohn asked: *"Qu'est-ce que l'instinct? Un mot;"* and Condillac remarked: *"L'instinct n'est rien;"* they expressed an opinion which finds little favor today. Instincts are now recognized as genuine forces and of supreme importance. Within recent years whole philosophies, social systems, economic structures have been erected with instincts as their foundation. The quotation given above represents a view in which instinct, far from being a mere word, is the prime factor in human activity; far from being nothing, it is responsible for everything.

When, more than half a century ago, the "marvels and mysteries of instinct"[1] first became subjects of considerable interest, the general opinion was that the instincts were God's peculiar gift to animals just as reason was His peculiar gift to man. "We may call the instincts of animals," say Kirby and Spence,[2] "those faculties implanted in them by the Creator, by

*Abstract of a Dissertation presented to the Faculty of the Graduate School of Yale University on the Candidacy for the Degree of Doctor of Philosophy in 1916.

which, independent of instruction, observation, or experience, and without knowledge of the end in view, they are all alike impelled to the performance of certain actions tending to the well-being of the individual and the preservation of the species;" but "man is, indeed, devoid of instinct; and his reason, if indeed it be of the same nature as that of the higher beasts, is as superior in its results as the instinct of the bee is to the instinctive turning of the plant to the light."[3] However, this distinction was soon overcome by a psychology which added to the old rationalistic method the method of objective observation which had already discovered the instincts in animals. Instinct was seen to be common to man as well as to animals, and it now became a question of what were the relative positions of instinct and reason in man.[4] The impetus of rationalism tended, for a time, to keep reason on its throne. However, the rise of Darwin and Spencer, and the swelling train of evolutionary doctrines which followed after them, tended more and more to minimize the importance of reason, until reason was finally reduced to the position of the handmaid of instinct. Whereas, in the past, men looked for a divine or rational principle to guide their conduct, they now turn to an analysis of their instincts. These, as James has so vividly shown, are not rational: they simply are,[5] and as such, must be taken at their face value. Therefore, the tendency today is to define character as a mosaic of instincts and emotions.[6] The finer sentiments and ideals of man are simply slight refinements of the instincts. The reversal is complete. Whereas the instincts were wont to be explained as the gift of God, God is now interpreted in terms of the instincts.[7] That is, the aims and values of the individual, as they are found in society, in art, and in the common pursuits of life, are simply the reflection of instinctive and emotional activities.

This almost Copernican change of emphasis marks a tremendous step in the direction of a clearer, more realistic conception of human nature. It opens up an entirely new realm for psychology and its various branches. It places the individual in a category where his behavior and the values he strives for

[1]G. Garratt: "Marvels and Mysteries of Instincts," 1857. Lord Henry Brougham: "Dialogues on Instinct," 1844. Jonathan Couch: "Illustrations of Instinct," 1847. T. L. Kemp: "Indications of Instinct," 1854.

[2]"Introduction to Entomology," 1858.

[3]T. L. Kemp, *op. cit.*, 138.

[4]Cf. H. R. Marshall: "Instinct and Reason."

[5]W. James: "Principles of Psychology," I, 386.

[6]Cf. Alexander Shand: "The Foundations of Character"; also W. McDougall: "Social Psychology."

[7]A notable example of this tendency is Benjamin Kidd's "Social Evolution." Almost all anthropological works adopt this view. Cf. Lippert's "Kulturgeschichte," introductory chapter.

may be made subjects of scientific research. It offers an opportunity for scientific speculation which has already greatly enriched the literature of the twentieth century.

Out of the valuable contribution to modern thought which the theory of instinct has made, however, there has risen also a serious danger. We are confronted today by a new kind of rationalism, the rationalism of instinct. This rationalism has substituted for the discarded innate ideas of an older, philosophical rationalism, a group of instincts, and with these as a starting point, has constructed systems which may some day seem just as fantastic and incoherent as the older rationalistic systems appear to us today. One of the most widely known examples of this type of rationalism is W. Trotter's exposition of the herd instinct. It will be remembered that Trotter attributes the entire range of social phenomena to four instincts, including the instinct of gregariousness. His particular hobby is the gregarious or herd instinct, to whose activities he ascribes a great range of human activities. The writer's interest in the problem of instinct was first aroused by the ease with which Trotter demonstrated the existence of the herd instinct and its responsibility for herd phenomena. To the writer it seemed almost as easy to demonstrate that all herd phenomena could be traced to the interlacing effect of instincts other than the herd instinct. In short, it seemed quite plausible to attribute all herd phenomena to other instincts *without reference to any herd instinct whatsoever.*

Probably the high water mark of psychological rationalism is McDougall's "Social Psychology." To the seven or eight primary instincts (including gregariousness) which he selects, McDougall attributes the fabulous wealth of modern social institutions. Strangely enough, McDougall himself condemns this kind of procedure on the part of philosophers. He quotes, in this connection, the assumption upon which V. Cousin bases his philosophy of history:

> "The various manifestations and phases of social life are all traced back to tendencies of human nature from which they spring, from five fundamental wants, each of which has corresponding to it a general idea. The idea of the useful gives rise to mathematical and physical science, industry and political economy; the idea of the just to civil society, the State, and jurisprudence; the idea of the beautiful to art; the idea of God to religion and worship; and the idea of truth in itself, in its highest degree and under its purest form, to philosophy. These ideas are argued to be simple and indecomposable, to coexist in every mind, to constitute the whole foundation of humanity, and to follow in the order mentioned."

McDougall then adds:

> "We have here the spectacle of a philosopher, who exerted a great influence on the thought of his own country, and who rightly conceived the relation of psychology to the social sciences, but who, in the absence of

any adequate psychology, contents himself with concocting on the spur of the moment the most flimsy substitute for it in the form of these five assumptions."[8]

McDougall's criticism is just. And yet he has done exactly the same thing. The chief difference in this case lies not in the method, but in the instruments at his disposal. The instincts, McDougall's instruments, are slightly more modern than Cousin's 'elementary ideas.' But so far as scientific coherence is concerned, McDougall's creation will probably appear as fantastic to future psychologists as Cousin's does to us today.

There is no questioning the fact that instincts are fundamental and determining factors in the organism and in society. But our knowledge of the instincts is by no means such as to warrant any wholesale speculation, far less any scientific certainty about the individual and social values to which they give rise. The writings of Carleton Parker have indicated with particular force the necessity of conservatism in respect to the claims made for instinct. Naturally it is gratifying to find economists like Parker and Fisher looking to psychologists for an explanation of the values which they and other economists have hitherto taken for granted. The attempt to interpret economic values in the light of instinctive tendencies cannot but add to the richness of economic speculation. At the same time, the need for a clearer definition of instinct and of the scope within which we may attribute specific values to instincts becomes all the more imperative. Let us therefore briefly consider the definition of instinct in relation to the determination of values.

I. The Mechanistic Conception

A careful analysis of instinct leads by direct steps from a consideration of complex, chain activities, to more elementary reflex activities. The tropism as defined by Loeb is instinct in its simplest terms. The tropism is a definite physico-chemical mechanism within the organism which, when properly stimulated, will give rise to a specific response. According to Loeb, the organism is entirely composed of such tropisms or instinctive forces. "Our wishes and hopes, disappointments and sufferings, have their source in instincts which are comparable to the light instinct of the heliotropic animals."[9] Aside from the biological rationalizing by which Loeb has arrived at this comprehensive claim for his theory of instincts, there is another question which must here be considered. How can an organism made up of tropistic entities experience hope and suffering? What kind of tropisms are these? If the activities of the organism are simply

[8] *Op. cit.*, 12 f.
[9] "The Mechanistic Conception of Life," 30.

a continuous series of tropisms, one mechanical unit impinging upon another, why should hope and suffering ever arise? There is implied here a conflict of instinctive forces, and a comparison of results which is quite foreign to the mechanical conception of instinct with which Loeb sets out.

As a matter of fact, Loeb quickly modifies his original idea of a tropism through the introduction of the concept "Unterschiedsempfindlichkeit," or 'differential response.' Instead, therefore, of simple instinctive forces, acting uniformly in the presence of a given object, we have tropistic forces that act largely in terms of past and present experience. The associative area, according to Loeb, is the center through which simple, mechanical activities are modified. With this qualification, the strictly mechanistic definition of instinct becomes so involved that it is impossible to select certain definite instinctive activities and attribute to them definite results and values. The tropism is now regarded not as an activity which determines the entire organism from time to time, but as an activity which is controlled or modified by the organism as a whole through the instrumentality of the associative area.

Loeb's mechanistic conception of instinct makes inevitable the conclusion that the organism as a whole enters into the determination of the part, and that the values sought by the instincts are dependent upon the values sought by the organism as a unit. And it is furthermore apparent, from Loeb's own statements, that the mechanical entities, the tropisms, which were intended to explain the actions of the organism, *do not even exist except in theory*. In reality, they are inseparable aspects of the organism and cannot be explained except in terms of the very organism which they were intended to explain. Obviously, the mechanistic concept as exemplified by Loeb has limitations as an explanation, whatever its value as a *method* may be. For the present, it is apparent that values cannot be explained or predicted, either for the individual or for society, upon the basis of mechanistic instincts. The mechanist may make any assumptions he pleases about life so long as those assumptions lead to fruitful results. But fruitful as have been the results of the mechanistic method thus far, they do not warrant the broad claims which psychologists have been making for instincts. These claims have grown rather out of a scientific romancing than out of careful and logical deductions from the facts which the mechanistic method has revealed.

II. The Behavioristic Method

The behavioristic definition of instinct is in general quite the opposite of the mechanistic definition. It usually insists upon the impossibility of explaining the character of an organism

as a collection of instincts, reflexes, or habits. It affirms, on the other hand, that the organism is a unit, possessing characteristics which are present in none of the parts into which it may be mechanically dissected, but which must be regarded as unique. Now this claim for uniqueness is the very point which the mechanistic conception is compelled to destroy, for the essence of mechanism is to reduce organic phenomena to the simplest possible terms, *i. e.*, physico-chemical elements. But when we ask the behaviorist to point out in what sense the organism is unique, he tells us, *behavior*. When we ask: "What is behavior?", the answer is: "Behavior is any process of release which is a function of factors external to the mechanism released."[10] Instinct, according to this definition, is naturally a form of behavior.

Strange to say, the rigid application of this definition of behavior destroys the very distinction which the behaviorist insists upon, namely, the uniqueness of organic as contrasted with mechanical response. According to this definition the response of a bell to a button is just as much behavior as the response of a man when his foot is stepped on. Each is a process of release which is a function of factors external to the mechanism. In order to avoid this dilemma the behaviorist then advances all sorts of criteria for the uniqueness of an organism, but none of his criteria satisfies. To make a long story short, he is unable to define the organic except in terms of behavior, and at the same time he is unable to define behavior except in terms of an organism. What distinguishes an organism is behavior, but what distinguishes behavior is its organicity!

It becomes evident that behaviorism rests upon an assumption, more or less clear in the minds of its adherents, as to the types of action which shall constitute its field of research. It selects the organism, not by logical definition but by practical judgment. There is no logical difference between behaviorism as applied to organisms and behaviorism as applied in physics, chemistry, or biology. Every scientist is a behaviorist in his field. And absolutely no scientific reason is given why the behaviorist should consider his theory or the objects of his research unique, except the reason that *they are his*.[11]

In short, behaviorism as a theory or method rests ultimately not on a logical but on a practical judgment, a choice of values.

As in the case of mechanism, behaviorism is not an explanation, not a philosophy. It is a method of investigation. And it is

[10]E. B. Holt: "Response and Cognition," *Jl. of P., Ps., & Sc. M.*, July 8, 1915, 371.

[11]The physiological explanation of behavior represented by H. L. Jennings only apparently escapes this statement. A criticism of physiological behavior will be made elsewhere.

for its usefulness in discovering and defining instincts that we must here value it. The essence of the behavioristic method is the establishing of certain relatively constant relations between certain stimuli and the responses of an organism or group of organisms. If it can be determined that a certain type of stimulus will almost invariably bring the same response from a certain group of organisms, then it may be assumed that the response is instinctive or habitual. The method is essentially a systematic attempt to correlate stimuli with responses.

The correlations thus far obtained in the field of human psychology through the behavioristic method, especially by Watson, tell us something about instinct. But it is certain that they do not tell us very much. On the basis of the behavioristic method, we have only the scantiest data upon which to base any conclusions regarding instincts. Certainly none of the results thus far justifies us in setting up anything but a tentative classification of instincts, far less in describing what certain instincts have accomplished, and least of all, what certain instincts will accomplish in the future.

It may be remarked that, although the behavioristic concept of an organism is antithetical to the mechanistic concept, the value of the behavioristic method is largely dependent upon the degree in which the mechanistic conception is true. Naturally, consistent correlations between stimuli and behavior cannot be formed unless there are those relatively independent tropistic entities which the mechanist describes. The difficulties which both the behavioristic and the mechanistic methods encounter in their search for such entities recur in another point of view from which the study of instinct is approached, namely, the part played by intelligence.

III. Instinct and Intelligence

Intelligence, no matter how defined, is a factor which greatly complicates the search for fundamental and relatively fixed instincts. Loeb identifies intelligence with the associative area, through which the tropistic actions are radically modified. The consistent behaviorist recognizes intelligence only in terms of the changing activities of the organism. Thus both mechanist and behaviorist wisely rid their technique of a troublesome anthropomorphic conception, even though they do not escape the necessity of explaining the complex reactions which the so-called intelligent organism displays.

But because the mechanistic and behavioristic conceptions avoid anthropomorphism, they ignore what is, after all, a distinctly anthropomorphic problem, namely, the problem of value. What we are interested in is an explanation of our individual and social values in terms of the instincts to which these

values have been attributed. Now the behavioristic method deliberately eliminates the concept of value, while the mechanistic method, if taken as a philosophy, renders the concept of value meaningless. This difficulty the concept of intelligence seems to overcome, for by definition, intelligence is the ability of an organism to *profit* by experience. But this obviously anthropomorphic definition of intelligence leads us into a whole library of controversial literature. It precipitates us directly into the problem of consciousness, its origin, its significance, etc. We cannot take up this controversy here. We shall here but call attention to a certain dilemma bearing upon our problem, which any idea of intelligence gives rise to.

Intelligence, as an aspect of consciousness, may be merely a concomitant, a spectator observing the activities of instinct. In this case, it can have no effect upon the instincts. Nor can it help the organism to profit by experience. On the other hand, intelligence may be a factor in the causal series which does enable the organism to learn by experience and to modify the original instincts. But if we admit such a factor, we admit the existence of something more fundamental than the instincts themselves. For how can the instincts, considered as mechanical entities, each giving rise to its characteristic value, combine to create a factor which shall represent the value of the organism as a whole? In so far as the instincts are defined as fixed and fundamental forces, it is impossible for them to create a principle to which they shall be subordinated. And on the other hand, in so far as we admit that the instincts are subordinated or harmonized, in terms of the organism as a whole, to some other factor such as intelligence, we must give up the claim that the instincts are the fundamental forces.

IV. Emotion and Instinct

This criticism applies equally well to that type of psychological rationalism which regards emotion as the criterion of instinct. We may disregard entirely the obvious fact that as soon as we begin to define instincts in terms of emotions anybody's introspections would make a book. But even if it were possible to define certain instincts in terms of their emotional core,[12] we should still meet this difficulty, namely: in so far as we define the instinct-emotions as fixed we cannot account for the endless variation of instinct; and in so far as we account for the obvious varieties of instinctive expression, we discount the fixity of the instinct-emotions. It is because he fails to meet this issue that McDougall's account of instinct-values can be so comprehensive and at the same time of such little significance

[12]W. McDougall: "Social Psychology."

from a scientific point of view. Another writer could start either with half as many or with twice as many instincts as McDougall takes and attribute to them the values of society with equal plausibility and equal futility.

V. Summary

We may sum up the results of the discussion thus far very briefly. The mechanist and behaviorist define instinct in such a way as to eliminate the concept of value. On the other hand, those who define instinct in terms of emotion and intelligence make it so easy to attribute all values to instinct that the pursuit becomes everybody's game and nobody's science. Again where instincts are considered fundamental and fixed forces value cannot arise. Whereas where instincts are considered merely elements in an organism which expresses values more comprehensive than the separate instincts themselves, the big question is: What relations exist between the values which represent the organism as a whole and the instincts which go to make up that whole? In short, how can the conception of mechanism and value be logically reconciled?

VI. The Valuing Process

There is, in all of the views which we have discussed, an apparent failure to take account of a principle which has an extremely important bearing on the problem before us. This is the principle of synthesis or fusion, variously stated and applied by writers of the last century. John Stuart Mill, in his Logic, formulates this principle under the name "mental chemistry." It is the principle of G. H. Lewes' Law of Emergents, Wundt's Creative or Psychical Synthesis, and the governing principle of all those psychologists of the Meinong and Külpe schools who think in terms of 'Gestaltqualität'. Briefly we may state this principle as follows: The sum of the properties of any number of elements is not equivalent to the properties of any compound of these elements. Or, put in another way: The properties of any compound are unique and independent of the properties of the individual constituents.[13] A simple illustration of this proposition is the fact that hydrogen and oxygen, when united, produce a compound which has properties that neither of its constituents possessed before that union. In terms of our problem, this means that the elements or specific instincts

[13] I am indebted to Dr. Henry Hooker for the exact formulation of this principle. J. S. Mill, in his Logic, states it in various ways, as for instance: "The effect of concurring causes is not always precisely the sum of the effects of those causes when separate, nor even always an effect of the same kind." H. C. Warren's "History of Association Psychology" describes this principle historically.

which are supposed to enter into the structure of the organism do not, when taken together, explain the organism or the values which it may give expression to. An organism resembles a compound and has qualities not contained in any of the instincts, reflexes, or physico-chemical configurations into which it may be divided.

Now what are the properties which characterize the organism as a unit but which do not characterize any of its elementary parts? There may be many such properties; but may they not be summed up by saying that the chief characteristic of the organism as a unit is the valuing process? Is not this the really unique quality of an organism, and is not the organism in its various activities governed by this valuing process? We have already seen that instincts, taken as mechanistic or behavioristic entities, cannot really determine or give rise to values in any sense. They can merely tend to give rise to a certain more or less stereotyped response. The values which instincts apparently give rise to derive their significance solely from the relation between particular instinctive tendencies and the tendency of the organism as a unit. And the tendency of the organism at any particular moment is just this practical value judgment, whether explicit or implicit, conscious or subconscious, which uniquely expresses the impulse of any one instinct in terms of its organic setting.

Now, although we have explained this principle after a chemical analogy, it by no means follows that the term "mental chemistry," as stated by J. S. Mill, applies to the situation which we have in mind. For instance, according to the principle of fusion, chemistry is quite within its field in predicting from a compounding of hydrogen and oxygen a substance with the chemical properties of HOH. But HOH, in a situation involving the organism, has qualities or values quite independent of their chemical explanation. In relation to the organism, HOH may be water, a substance having the quality of wetness, and this quality is itself a factor which enters into the causal series and which determines the uses to which water shall be put. Just so, the actions of any theoretically isolated instinct may be explained in chemical, mechanistic, or biological terms, but in its organic setting it expresses itself uniquely in terms of organic values which themselves affect the operation of that instinct and which are not explained by the elements of which they seem to consist.

Therefore, the valuing process, through which the organism is continually expressing itself, is not to be regarded as an 'over-phenomenon' or as a static accompaniment of organic processes, but as itself a dynamic factor in the causal series; for it actually

enters into the determination of the instincts of an organism under certain conditions.[14]

It is the valuing process which brings about such radical changes in the instincts themselves, often causing the organism to act in complete contradiction of the stereotyped tendency of a powerful instinct. For example, we are told that the instinct of self-preservation and that of propagation are the most powerful and fundamental in the organism. And yet, we have numberless cases of individuals who have deliberately sacrificed their lives for values which they considered higher than life. Now it requires a strong stretch of the imagination, or a long process of rationalization, to explain how the instincts of life can give rise to values which exterminate the very instincts upon which they are supposed to be based, unless we recognize the validity of the principle which we have presented.

It may be answered that intelligence and reason are what enable the individual to subordinate the various instincts so that they will serve in the interests of the entire organism. Reason makes it possible for a person to see that his own life is less important than the life of society or the life of a friend. But what is reason without the play of a dynamic valuing process? Reason is essentially a playing against one another of a number of alternative values or value ideas, ending in the final adoption of one of them. What makes it possible to select one from a number of possible values is the presence, within the reasoning process, of a dominating value idea. It is the activity of this dynamic factor which gives to the reasoning process its significance, and which makes possible a choice of values quite at variance with the traditionally instinctive values.

It is really remarkable, once the unique character of the valuing process in an organism is grasped, to see how this conception completes or clarifies many of the problems which have been confronting us. Take, for example, the traditional division of the mind into cognitive, conative, and emotional states. Much of psychology has been concerned with an attempt either to distinguish or to reconcile these three faculties. Now, obviously, the fundamental factor in will, feeling, and reason is the selective factor, the valuing activity. Each of these three aspects of organic activity, therefore, is an expression, in slightly different form, of the valuing process. This is their common denominator.

In speaking of the valuing process as a common denominator it should not be thought that we are introducing into the complex-

[14]A corollary of this, at least in principle, is J. S. Mill's statement to the effect that the generation of one class of mental phenomena from another does not supersede the necessity of an experimental study of the generated phenomena and their laws.

ity of organic and physical events the undue simplification of a mere word. For when we regard values as expressed by an organism, not as abstract mathematical functions nor as merely the mental side of a psychophysical parallelism, but as dynamic factors which themselves play an important part in the determination of instincts and the structural elements which make up the organism, we are describing a situation which is anything but simple. Indeed, our concept of value, properly interpreted, makes inevitable the conclusion that the phenomenal world is infinitely more complex than the deductions of many mechanists, behaviorists, psychologists (especially social psychologists) and others would lead us to believe. On the other hand, the valuing process, using the term as a class term, may consistently be regarded as the commom denominator in the explanation of all phenomena. For the valuing process, or some experience of value analogous to the simple experience that water is wet, is the point from which all reasoning and logical definition have their origin and to which, sooner or later, they must return. No matter where we look, no matter in what branch of science we may engage, the starting point or major premise is not a disinterested, logical conclusion, but an apparently arbitrary, certainly a highly interested dictum. But here again our assertion must be qualified by adding that, although value judgments are the logical limits of all scientific and philosophical reasoning, it by no means follows that the valuing process implies an absolute or unalterable standard of values. Values themselves are relative factors in a strictly relative series of phenomena or experiences. As such, they are subject to change either through a combination of unexplained circumstances or through the systematic investigations of science. To give a homely example, we may value beer as a healthy antidote for thirst; but the results of chemical and physiological investigations may later cause us to choose tea rather than beer. The very fact that values, which instincts are supposed to have produced, are subject to change in this fashion, still further complicates the problem of the relation between instinct and value.

VII. The Philosophy of Instinct and Value

Our study has now led us directly into the field of philosophical speculation. As a matter of fact, only a philosophical point of view can, at present, grasp the relation between instinct and value. And it is only philosophically that we can, at the present stage of the sciences, attribute values to instinct at all. This point will become clearer as we proceed. But even philosophy has struggled long and hard without becoming conscious of the

full significance of the valuing process. Philosophers have speculated all around the value idea, but have seldom realized in it the starting point of all philosophical speculation. The Greek philosophers made reason the distinguishing feature of man, but their emphasis on pure reason misled them. They failed to realize that reason was but a means of the human organism to an end; that the practical reason rather than pure reason was the characteristic aspect of man; and that the practical reason, out of which the pure reason grew as a tendril from a vine, itself proceeded only from the activity of the valuing process. The intellectual cast which the Greeks gave to philosophy has characterized it ever since, so that philosophy has developed largely into a problem of knowledge, an epistemology. In modern philosophy, the tradition of Hegel has reigned, and all life has been interpreted in terms of intellectual ideas, intelligent purpose, absolute knowledge, or completed meanings. It is therefore nothing less than astonishing to find how dependent even the most intellectual and disinterested philosophers are on the implied existence of the valuing process. Kant is, of course, the notable example. On the one hand there is the Critique of Pure Reason and on the other the Critique of Practical Reason. The moral imperative is a rather pompous but still easily recognizable exposition of the valuing process. Certainly, according to our point of view, it is the much more profound and enduring of his two philosophies, though most philosophers have considered it as something of an after-thought. On the other hand, Henri Bergson deliberately contrasts these two aspects of philosophy. The intuitive experience to which he gives priority more nearly resembles what we have described as the valuing process; though by interpreting life in terms of a vital force or an impulse rather than in the terms of a dynamic valuing process, Bergson was led into a serious and unnecessary contradiction between intellect and intuition, between intelligence and instinct, between the mechanical and the organic.

Bertrand Russell stands out among philosophers for his determination to eliminate the disturbing factor of value from philosophy and for his attempt to make philosophy a pure science. And yet Russell, at almost every turn, governs his theory by value-considerations. It is impossible to recount instances here, except to mention his analysis of 'hard' and 'soft' data, but an examination of his writings will reveal how continually this disinterested philosopher makes scientific decisions on the basis of a practical or value judgment rather than on strictly logical or theoretical grounds. Again and again he adapts his proof to the end in view, and as long as his theory enables him to construct in a fairly coherent manner those beliefs and values which he will not give up, he finds his theory satisfactory.

When we come to modern idealistic philosophers, we find that the valuing process is a key to many of the problems which they present. If we take, for example, Royce's analysis of an idea, we see an immediate connection with the valuing process. The significance of an idea, according to Royce, is what it intends. The difficulties which this philosophy encounters are clarified, even though not explained, when we see that at the root of all ideas is this dynamic valuing process. What an organism values may be imperfectly felt, and only faintly understood; still this value is bound to express itself finally in some coherent judgment. It is the value idea that "seeks its own."

As for Pragmatism, it has often been described as a method, not a philosophy. Our account of the valuing process provides a philosophic basis for Pragmatism. Why is it that immediate experience is the touchstone of all knowledge, morals, art? Because the significant fact about immediate experience is the valuing phenomenon. The sense of a dynamic value-idea constitutes both the given element of an immediate experience and the manner in which it shall work itself out in the thinking process. And when the Pragmatist asserts that the final test of truth is its workability, he implies the whole philosophy of the organism as a valuator. For every attempt at truth begins and ends with a concrete valuing judgment. And it is impossible to define workability except in terms of an evaluating standard. The organism and its unique qualities as an evaluator are therefore the philosophical concept upon which Pragmatism rests. As soon as the Pragmatist attempts to explain the significance of immediate experience in terms of instincts, reflexes, tropisms, sensations, etc., he falls into the abstract atomism of physics and chemistry, and loses the very thing he sets out to explain.

This and the philosophy of history are preëminently concerned with the question of value. The possibility of any system of ethics naturally depends upon the selection of a relatively fixed and generally accepted set of values. What most ethical philosophers fail to recognize clearly enough is that these values are never arrived at by a process of pure reasoning or by any scientific procedure. A system of ethics is built up only because the values which it arrives at were already actively present in the thinking process of the philosopher. Consequently we have a Paulsen whose highest value is energy: Aristotle chooses abstract reason: Kant chooses the moral law: the materialist chooses happiness or success. All these, with many minor variations, are clearly the result of the somewhat different personal values with which each individual works.

When we come to the interpreting of history and evolution, this phenomenon reaches its most dramatic significance. Why is it that practically every anthropologist and evolutionist con-

siders the present as the pinnacle of the past and survival as the test of supremacy? Why is it characteristic of historians to regard the events of history merely as the steps and errors by which the present high stage of civilization has been reached? Is it not because the values accepted by the living are the colored glasses through which they view the dead? The present is the highest or most valuable, not because it is an epitome of the past but because we, at this moment, actually value it most. Our values are not valuable because they have survived but because they are *our* values and because *we* value them. It is primarily because the survivor does the valuing that the values which survive are considered valuable. And it is because the surviving historian or the victorious nation *writes the history*, that the values which remain come to be considered the highest values.

VIII. Three Definitions of Instinct

We have now seen that the meaning of value does not lie in an analysis of instinct. Such an analysis but leads us further and further from the meaning of value. And yet it would be merely academic to insist, because instincts are not the fundamental determinants of value, that they play no part in its determination. We feel sure that the instincts do play a part, and a very important part. The question is, How and in what way? The answer to this question may be given in three parts, involving three separate and distinct definitions of instinct.

(1) *The Mechanistic Definition.* This definition has already been thoroughly described in the first part of this paper. Instincts, according to the mechanistic point of view, are definite physico-chemical entities which respond specifically to specific stimuli. The Loeb tropism, the chain of reflexes, the inherited nervous-muscular mechanism, are examples of instincts in the mechanical sense. Even the instincts sought for by the behaviorist, in so far as he is consistent, are mechanistic instincts. Now the mechanistic concept of instinct, we have pointed out, is extremely valuable as a method of research. It has notably enriched our concept of organic behavior and human nature. However, it is practically impossible to find instincts which satisfy the mechanistic point of view. Only certain lower organisms approach mechanical uniformity in their instinctive responses. And if organisms mechanically perfect could be found, then we should be unable to find any values whatsoever. For the very nature of value lies in the combination of imperfect organic mechanisms, conflicting tendencies, an unfavorable environment, and probably the presence of certain indefinable hereditary tendencies. It is this combination of a variety of things which gives rise to the active valuing process which is

probably the unique quality of an organism. We may say, therefore, that the mechanistic definition of instinct is a valuable working concept, but that instincts as thus defined have no real existence and cannot legitimately be used as an explanation of the phenomena of life in general.

(2) *The Pseudo-Scientific Definition.* However, the mechanist himself finds it impossible to adhere closely or consistently to a purely mechanistic conception, and so we find ourselves very soon in possession of a more flexible and less critical definition of instinct. According to this definition, the relatively distinct and specific ways of reacting to the environment are united into comprehensive tendencies which we call the principal or dominating instincts. The striking thing about instincts as thus defined is the fact that almost any instinct or organic mechanism can come to respond in an infinite number of ways to an infinite number of stimuli. This is the concept of instinct most prevalent today and most viciously used. It is characteristic of McDougall and many other psychologists. And it is the concept now made use of by economists, litterateurs, industrial men, and others who fondly think that they have found in psychology a simple answer to problems which have hitherto defied their attacks. This concept of instinct lends itself most readily to the manipulations of pseudo-psychologists and pseudo-scientists of all kinds. As James remarked—and it cannot be too often repeated—it is possible to make almost any classification of instincts on this basis, as long as it answers the writer's purpose.[15] And this is exactly what has been done.

Now we may believe with justice that instincts are important factors in the valuing process, but we cannot with any degree of scientific accuracy say that any instincts thus loosely defined are responsible for any particular values. We can romance about the subject. We can philosophize. We can psychoanalyze. We can rhapsodize. But all within very narrow limits. It is absurd for economists to believe that they can translate their study of economics from the field of conjecture to the field of science by borrowing a set of ready-made instincts from psychology. We can imagine Thorndike, Watson, McDougall, and a few others trying to agree on a classification of instincts as the axioms of economics! We may agree empirically upon the uniformity and strength of the sex instinct. But what relation has this instinct to the marginal desirability of a second, third, or fourth wife? We may believe in hunger as an instinct. But how does this instinct determine the marginal value of artichokes over cabbage, or chicken over duck? Self-preservation seems an obvious instinct and yet how does it determine

[15] "Principles of Psychology," ii, 382.

the marginal desirability of a dull, long-drawn-out existence over a short but exciting life?

If instincts, mechanically defined, can hardly be found existing, instincts according to the second definition can be manufactured so readily and so voluminously as to reflect seriously upon the mental process by which it is done.

(3) *The Popular Definition.* The third definition of instinct is the most vicious of all. Here instinct is practically synonymous with any mysterious manifestation of the organism. We hear of the religious instinct, the moral instinct, the instinct of service, the artistic instinct. Instincts on this level are responsible for such a wide range of values that they might as well not be responsible for anything. Like the benevolent monarch who, unknown to his grateful people, had been dead for twenty years, these broad instincts are but convenient names to which we can never attribute any specific value in any specific sense. We need only take the final step and call the valuing process itself an instinct in order to call attention to the absurdities into which such a loose definition of instinct can lead us. Such logic is undoubtedly what led Condillac to remark that instinct was nothing and Bohn to say that it was a mere word.

IX. Conclusion

Indeed, it requires an effort to keep the idea of value separate from the concept of instinct. Just because value is, in one sense, an unanalyzable factor, we tend to regard it as a sort of mysterious force, a sort of super-instinct which in some mysterious fashion governs and determines the lesser instincts. Undoubtedly, it has often seemed that this was the concept we had in in mind—a kind of over-soul, referee, independent valuator, Absolute, entelechy, which ruled the system of lesser values to which instincts gave rise. Nothing could be further from our intended meaning. Value, either as an idea or as a process, is to be regarded as a characteristic of an organism—a peculiar and unique quality, to be sure—but nevertheless a characteristic. We can but revert to our initial example of water. The unique characteristic of water is wetness, and more specifically, a wetness which only exists between certain degrees of temperature. This wetness is characteristic neither of hydrogen nor oxygen, any more than value is a characteristic of the instincts considered as entities. Now when the instincts—whatever they are—and the protoplasm, the germ-plasm, the effects of environment, are united in the form of an organism, the result is a new characteristic, namely, the valuing process. This process is not merely an intellectual spectator but an active, causal factor just as much as is the wetness of water. It enters actively into the

determination of instincts *and* habits, just as the quality of water is an active determinant of the uses to which it is put.

Therefore, there is in our concept of value nothing of the mystical or the absolutistic. Simply because value-judgments are in a sense the ultimates in our reasoning process, they are not put beyond the realm of knowledge and investigation. Because the present mechanistic conception of instinct is incompatible with the notion of value, we do not mean that there is an unbridgable gap between mechanism and organicity. And if the popular method of ascribing human values to instincts is fantastical or far-fetched, this does not mean that instincts in some way or other do not play a very important part in the makeup of values.

Although there are many conclusions to be drawn from our study, relating to value and instinct, the ones of most importance at the moment are two: first, that the vague and varied notions of instinct now prevalent have led to the wildest and most far-fetched conjectures as to the relation between instincts and values; and secondly, that as soon as we attempt to define instincts with care and precision, we shall be much more modest and scientific in the claims which we make for them. Such moderation and care will in the end lead to a much more accurate correlation between instincts and values than the elaborate cadenzas which psychological virtuosi are now improvising upon the general theme.

THE PSYCHOLOGY OF REFLEX ACTION

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I. *The Problem of Reflex Action.* Extremely anomalous is the position of reflex action in the domain of psychology. At least psychologists seem to be doubtful concerning the orientation of such behavior in the general psychological field and hesitant as to the exact attitude they should take toward reflex action. Traditionally, psychologists have been able to grant no more than that reflexes are exclusively physiological processes, because psychologists have always considered knowing as the essential datum of their science. To accommodate the fact that reflex action actually constitutes a part of the response equipment of organisms, as the biological influence upon psychology made apparent, reflexes, though not considered to be psychological phenomena, were tolerated as the motor accompaniments or the motor conditions of mental states.

In recent years a number of important conditions have conspired to bring about essential modifications in our attitudes toward reflex action, and especially influential in this connection is the fostering of the conviction that reflexes play a larger part in our total adjustments than was ever before realized. Prominent also among these conditions were the discoveries concerning the conditioning of reflexes. So recent have been these discoveries that at the present moment, lacking the necessary perspective, we are unable to realize precisely how great the changes are which they have effected in the domain of psychology, although it is apparent of course to everyone that important changes have taken place.

Another equally significant and by no means unrelated condition is the fact that psychologists in general are drifting away from the idea that a psychological datum is exclusively or even primarily a knowing fact in the sense of some psychic stuff or mental function, toward a more organic position. How great the change of front toward reflexes has been may be observed at a glance in the view now current and gaining ground that all psychological facts are based upon and developed from reflex action. Poignancy is added to this change of front when we reflect upon the great gulf which psychologists once considered to separate physiological behavior from elaborate knowing activities. As important as reflex actions undoubtedly are it

yet seems that we are going too fast and too far in our newer emphasis upon such behavior. Because there exists apparently so much uncertainty in the attitudes toward reflex action, the following study of reflexes is undertaken, with the aim of offering some suggestions toward the redefinition of these interesting and important types of behavior.

II. *Distinction Between the Psychological and Physiological Attitudes toward Reflexes.* Although, as we have endeavored to suggest in the preceding paragraph, psychologists have traditionally held themselves aloof from reflexes, because the latter were presumed to be entirely physiological, strangely enough it is owing in great part to the investigations of physiologists that the need for a closer study and understanding of reflexes by the psychologist has manifested itself.

How strange in fact it is that the physiologist's study of the conditioning of reflexes should induce the psychologist to recognize that a reflex action can and must be looked upon as a response to a stimulus, that is to say, an adjustment act, can be readily appreciated when we observe how great the differences are between the psychological and physiological attitudes toward reflex action. What is then the difference in the two attitudes? Merely this: that while according to the psychologist a reflex must be looked upon as a special adjustment of the organism as a whole, for the physiologist a reflex action is the operation of an autonomous system of particular parts of an organism. Now if this distinction is valid it is obvious that in order to reach an accurate description of reflex behavior this differentiation must be kept in mind.

Because the physiologist, while studying reflexes, is primarily interested in the functioning of neural structures, and secondarily in the activity of glands and muscles, he is disposed to look upon such behavior, as well as other types of responses which he studies, as constant mechanisms entirely independent of the surrounding stimuli. From this fact arises the distinction long current in psychological literature between the so-called physiological and sensation reflexes, the former being presumably completely autonomous and without the controlling influence of awareness. Accordingly the psychologist assumed that typical reflexes are exemplified by the visceral activities. Since on the whole, therefore, a reflex action for the physiologist consists of the innervating activity of a segmental neural apparatus, a limited extension and flexion of muscles, and the localized action of glands and nothing more, we must look upon the physiological description of a reflex action as an abstraction, wholly unsuitable for use by psychologists.

From the psychological standpoint, as we have suggested, a reflex action is a definite adaptation act and upon such a basis

is just as much a psychological datum as is thinking and knowing. Strictly speaking, the psychological organism under ordinary circumstances cannot act otherwise than as a psychological organism, and this refers to all activities, although for some purposes we might consider the individual performing isolated reactions such as merely digestion, etc. But these situations are exactly analogous to those accidental circumstances such as being struck by an automobile in which instance the individual may function as a mere physical object. To be entirely precise at this point we mean to point out that as a general principle, our exogenous reflex activities are stimulated to action by objects and events about us and operate as adaptational mechanisms in exactly the same sense as any psychological act.

In general, then, we may take as our standard for the differentiation between psychological and physiological reactions, a criterion which we verily believe to be in the main reliable, the question whether an act is or is not an organismic[1] response to stimulating circumstances. Now in order that an act should be considered a genuine organismic response we must be able to trace its arousal to some effect produced upon the person by some external object or some need for adaptation existing in the organism itself. Accordingly, as we might expect, no sharp lines of division mark off the internal from the external reflex stimuli. A food object operates precisely as does the hunger reflex (gastric contractions) in the arousal of salivary reflexes. Similarly from the standpoint of effecting an action in the person there is no functional difference between another person (opposite sex) and genital reflexes in the acting person when each serves as a type of stimulus to elicit (other) sexual reflexes. Whether the stimulus be endogenous or exogenous the reaction which it calls forth is an adaptation of the individual in just the same way that a habit or thought reaction is. On the whole, we find the reflex to be (and this is why it is a psychological act) an interconnection between organisms and specific things; or in better words, reflexes are the operation of reciprocally interacting stimuli and responses. Thus when I see a dish of apples my salivary reflexes may begin to operate, while a dish of peaches may not have the same effect at all. Now here the physiological attitude, according to which the problem of the reflex begins and ends entirely within the organism, contrasts with the psychological study in that the latter is concerned with (1) the means whereby the end-effect, which is the secretion or muscular contraction, is initiated, and (2) how the act is dependent upon the reactional characteristics of the specific individual performing the act. The psychologist cannot afford to overlook the fact

[1]The term organismic refers to the absolute inseparability of the response and stimulus factors in a psychological reaction.

that reflexes are very strictly conditioned and that upon the type of stimulus object which elicits the reaction depend the intensity and range of the behavior.

Persuasive as an argument for the organismic character of reflex action is the testimony of the physiologist himself. Asserts Sherrington, than whom no investigator is more qualified to speak in this matter, that reflexes are fractional pieces split off from an animal's total behavior which are artificially though conveniently treated apart[2], and that a simple reflex is probably a purely abstract conception, a convenient if not a probable fiction.[3] Furthermore, even the experimental physiologist finds it necessary to declare "that the reflex reaction cannot be really intelligible to the physiologist until he knows its aim."[4] And so the physiologist considers as an essential part of the investigation of reflex phenomena the eliciting of their purposes. This does not mean at all the indulgence in any factually baseless speculation, but merely involves looking upon a reflex action as a fact in its adaptational perspective. When the operation of a reflex mechanism occurs, it is necessary in the interests of a fair understanding of it, to include as many as possible of its essential features. Among such essential features we may mention the influence upon the reflex action of the location of the stimulus—the local sign of reflexes, as Sherrington calls it.

If the experimental physiologist acknowledges what we are pleased to call the definite psychological character of reflex action, certainly the psychologist may well pause to reconsider his habitual descriptions of such behavior. Let us hasten to add in unequivocal terms that to adopt the psychological standpoint of studying reflex action means not at all that our study will lose one iota of its objective character. On the contrary, such a method of study will add completeness as well as definiteness to our descriptions. In plainer words, the psychological standpoint implies that we shall look upon the reflex response as well as upon every other act that falls within our purview, as the adjustment of a psychological machine, in the sense that we shall correlate the acts of the organism with the coincidental surrounding conditions.

Is it necessary to add, in view of our discussion and our calling to witness the experimental physiologist, that there is no actual conflict between the physiologist and the psychologist? No such conflict exists in fact, since each worker is merely interested in a different phase of the same series of events. While the psychologist is interested in the total action of the person to some definite stimulus, the physiologist is interested

[2]Integrative Action of the Nervous System, 1911, 237.
[3]Ibid., 8.
[4]Ibid., 238.

in the workings of the reflex mechanism as they operate within the organism itself. What we are desirous of showing is that when the psychologist is satisfied to duplicate the work of the physiologist then he cannot hope to do justice to the psychological facts in the case.

If our distinction between psychological and physiological behavior is valid, we find in it a compelling warning not to confuse reflex behavior with the truncated activities of injured and partially destroyed organisms. All experimental animals such as the decerebrate pigeons of Flourens and Schrader, Goltz's dogs and other laboratory animals exhibit atypical forms of behavior which cannot be fairly taken as examples of reflex responses. How valid this point is will come out later in our discussion of the differences between normal responses of animals and human beings.

III. *The Nature of a Reflex Action.* From the psychological standpoint, then, we must look upon a reflex action as a specific sort of behavior segment and this means, as we have indicated, that we must not only investigate the response mechanisms but the stimulating circumstances as well. Now the special reflex characteristic of the reflex type of behavior segment is that there is only one reaction system in it. To be more specific the reflex activity, although the adjustment of a complex animal or person, is a simple and immediate final response to a directly presented stimulus. Obvious it is then that there are no precurrent or anticipatory reactions in reflex segments of behavior such as we find in our complex behavior segments, in which the final act is preceded not only by a definite attention set but also by another reaction which we may call a free perceptual or ideational act, and still other sorts of responses.[5] It is the absence of the anticipatory or precurrent responses which justifies the statement that reflexes involve no foresight of the end or knowing by the organism with respect to what is to take place before the response occurs or what is in fact transpiring at the moment of action. But what of the complicated reflex behavior in which apparently several adaptations are taking place? Upon investigation we find as a matter of fact that such behavior can be analyzed into a series of behavior segments; that is to say we can analyze the behavior into a series of stimulus and response coordinations. And here, as is not the case elsewhere, we have a chain effect. One final response serves as the stimulus for the next reaction and so on throughout the series no matter what its length.

From the unitary character of the response in the reflex segment of behavior follows the fact that reflex action is abso-

[5]For a detailed analysis of a reaction system see an article in the Journ. of Philos. 1921, 18, 253.

lutely unintelligent action. And this statement holds true no matter how complexly conditioned is the response act. For the character of intelligence is an essential contribution of the precurrent reaction systems. The latter are means of conditioning actions so that they can serve to adapt the organism in a very precise way to a particular total stimulating circumstance. Needless it is to contrast this prescient type of conditioning of one part of a response by another phase of the reaction, with the simple conditioning of a total reaction by the stimulus, as is the case in reflex behavior. The most complex conditioning of the latter sort, while demonstrating an awareness on the part of the reacting organism, merits in no degree the ascription of intelligence.

As a consequence of the unitary character of the reflex response it appears to possess the following specific characteristics, namely (1) relative automaticity, (2) constancy, (3) permanency, and (4) localizability.

(1) *Relative Automaticity.* Since there is but one immediate movement or one essential secretory act, then the reflex response must perforce appear as practically automatic. An evidence of the automaticity of the reflex is the fact that it occurs and reoccurs in practically the same way no matter what the person is doing at the time or where he is when the stimulus is presented. It is obvious, of course, that when the reflex behavior segment is connected with other segments the total behavior situation of the person may appear different, although the individual reflex act remains the same. Generally speaking we might consider that the mere presence of an adequate stimulus, whether primary or secondary, will throw the reaction system into automatic operation.

It is needless to add perhaps that the automaticity of reflex action is relative in the sense that no psychological reaction can be wholly without spontaneity. What is meant of course is that relative to other responses the reflexes are immediate and direct consequences of the stimulation. There is, in fact, a very close relationship between the stimulus and the response, and no variation through interpolated responses is possible between the appearance of the stimulus object or situation and the final adjustment.

(2) *Constancy.* The constancy of reflex actions is a fact which follows from the function which they perform in the various adaptation situations of the organism or person. Reflex behavior of the simpler sort adapts the person to the simple maintenance situations in which he is found, such as shielding ourselves from immediate noxious stimuli and nourishing ourselves in order to grow. Note that in the trophic reflexes, for example, the mere presence of the food objects at certain strat-

egic points of contact with the organism (at pillar of fauces, for deglutition) brings about the action; also in the shelter reactions, the pin prick, the hot or cold object must be in immediate contact with the organism. Now all of these food and shelter conditions are constant factors in the surroundings of the individual and consequently the reflex adaptations remain constant in their functional and morphological character, although as we have intimated, in the human being reflexes may become organized with other behavior segments. It is possible also that the reaction system as a whole in reflex behavior segments may become slightly modified because of changes in the size and tonicity of the organic apparatus, although the general character of the reaction remains constant.

(3) *Permanency.* Since reflexes are elementary forms of responses adapting the organism to permanent specific conditions they are permanent factors in the reactional equipment of the organism. Moreover, reflex reaction systems do not become integrated and modified to become phases of larger and more complex reaction systems. They remain simple reflexes. We have already indicated that complex reflex adjustments consist of numerous repetitions of a particular reaction system of which the preceding members of the series serve as stimuli to the following ones. In short, a serial reflex is merely a series of behavior segments and not an integration of reflexes into more complex behavior.

(4) *Localization.* The comparative simplicity of reflex reaction systems and the definiteness of their operation permit us to look upon them as partial acts. As a result, it appears as though the organism operates in limited segments when functioning reflexly. Thus we speak of an eye or hand reflex. This partial functioning is not an actual fact, however, for it is a biological and psychological impossibility for the organism to act unless it acts as a whole. When we withdraw our hand from a hot object with which it accidentally comes into contact we obviously react as a complete organism. Similarly every reflex no matter how great a change it produces in the person's relations to his surroundings may be for practical purposes circumscribed and localized in a comparatively limited area.

IV. *The Analysis of a Reflex Reaction System.* Since from our standpoint the reflex reaction system is a typical example of the ordinary unit of psychological activity it would be unnecessary to single it out for analytic description were it not for the fact that reflexes are frequently and always fallaciously presumed to be different in principle from other forms of behavior. To us it hardly seems possible that such a difference should exist and as it is entirely unlikely that any asserted dif-

ference will lie in the glandular, muscular or neural mechanisms involved in reflexes and other action types, we may therefore confine our analysis to what would conventionally be called the mental phases or accompaniments of reflexes.

Let us be understood then, as forthwith declaring that whatever factors are present in psychological responses of whatever description are found also in reflex behavior. And if psychological phenomena may properly be partitioned into cognitive, conative and affective factors, these factors are found in reflexes no less than in any other behavior segments.

(1) And first let us consider the cognitive factor. Every reflex action involves a definite discrimination of stimuli, although the discriminative factor is more pronounced in some reflexes than in others, a condition, however, which reflexes share with all types of psychological behavior. If evidence is needed to prove the presence of a cognitive element in reflexes we need only refer to the fact that in common with all psychological responses, reflexes require their specific adequate stimuli to put them into operation. A hot object will call out the reflex, while a warm object will not produce such an effect. Again, the conditioning of reflex behavior constitutes excellent testimony to its psychological character.[6]

What precisely is cognition then? It is necessary to specify that by cognition we refer to the fact that different objects elicit differential responses from the reacting person or organism. Clearly, in the case of such comparatively simple responses as reflexes the differential reactions will be aroused not so much by complex objects as by simpler qualities of such objects, or in many cases the differential response may be elicited by a condition rather than by any specific quality.

Obviously, we must all agree with those who assert that when we perform a reflex reaction we do not know just what is taking place, for in such a reaction there is lacking the verbal response systems which among other factors strikingly represent the knowing element. This absence of overt knowing, however, in no sense militates against the fact that a reflex action is a differential reaction or a cognitive process. As we are planning to indicate in a later section of this paper, the entire general prejudice against regarding reflexes as psychological processes,

[6]Probably this point does not require much emphasis since we find in a definitely mentalistic textbook the following footnote: "The purely physiological reactions are not absolutely divorced from consciousness. It is a demonstrated fact that mental states may influence or even initiate these physiological activities. The perception of food may start the secretion of saliva. The presence in the mind of certain ideas may affect circulation and respiration—the bated breath, the blush of shame, the pallor of fear, the flush of anger, all testifying to the effect of consciousness upon the purely physiological activities." Breese, Psychology, 1917, 398.

as well as the particular bias against looking upon reflexes as involving cognitive factors, have their roots in the acceptance of an unsatisfactory conception of cognition. This conception implies that knowing is something separated from the adjustmental act. We believe that all difficulties involved in the ascription of cognition to reflex action are dissipated when we recall that by such action we mean in the final analysis an adaptation of the complete organism.

(2) In similar fashion we may find in reflex action an affective factor also. Otherwise stated, an analysis of such behavior reveals a change produced in the organism which we may well call a feeling condition. Glandular and visceral activities are aroused indicating that not only has the stimulus object been acted upon by the organism, but also that the action has extended to itself. Here again it is entirely superfluous to suppose that in any sense the person overtly reports to himself that he feels thus and so; the feeling situation or affective response is merely a sort of internal response involving relatively more the visceral organs than the external skeletal muscles. Naturally the diffusion and intensity of the visceral disturbances will correlate with the violence of the response to the urgency and pressure of the stimulus.

(3) In much the same manner can we analyze in reflexes the conative factor, by which is meant the attention change from one stimulus to another. In no reflex action, of course, is there present the deliberate precurrent change of position or attitude by which the individual prepares himself for adaptation to a new stimulus. Hence, if the term be allowed, the attention factors in all the various reflex action systems are involuntary, that is to say the person exhibits more or less violent jerky movements in shifting his adjustments to new stimuli.

Once more we repeat that throughout this entire analysis of reflex reaction systems we refer to the behavior of psychological organisms or persons. To those of our reactions which are merely biological responses, namely tropisms, and we cannot well doubt that we occasionally perform such behavior, these descriptions which we have offered do not at all apply. In the interests of accurate description we cannot be too careful at this point, for since the psychological organism is obviously a biological organism as well, it consequently is sometimes, albeit very seldom, thrown back upon what we must call biological or tropismic modes of response.

V. *Reflexes Are Not Neural Mechanisms.* If our description and analysis of reflex behavior segments are corresponsive with the facts in the case, then it is manifest that our interpretation of reflex action is in conflict with and must replace the prac-

tically universal belief that these forms of behavior are merely specific forms of neural arcs or circuits. In clearer words, the essential thing about a reflex action is supposed to be a particular concatenation of neurons, usually described as preformed patterns in the nervous system. Probably the most fundamental error in the neural theory of reflexes is that the neural apparatus is in some sense presumed to be the cause of the muscular movement and glandular action which constitute the observable results of the reflex action. In the neuronic theory apparently the neural circuit replaces the soul or consciousness as cause of a given adaptation. Credence is lent this view when we consider that as a matter of historical fact the so-called spinal reflex was sometimes considered to be the exclusive reflex type of action, while at other periods the spinal reflexes were presumed to be the typical if not the exclusive reflex responses.

In addition to the general difficulty which is involved here, of neglecting most of our reflex reactions, for we probably have as many cerebral as spinal reflexes, another question arises equally fundamental for the whole of physiological psychology. Does the neural apparatus control the muscles any more than the muscles and glands control the neural apparatus? Is it not a fact that the specific pathways involved in any reaction are involved because certain muscles or glands need to function? The writer is firm in his disbelief in the functional priority of any system to any other. In fact, to our way of thinking no such priority exists or can exist in the ordinary circumstances of behavior.[7] Especially clear becomes the problem of the supremacy of the neural apparatus when we consider the activities in which the muscle spindles are the primary receptors, for in such activity we have a circular process from which it is extremely difficult to analyze out prior or posterior phases of the reaction. This action in our opinion minimizes the general view of the primacy of the neural apparatus in any type of reflex action.

Is it not closer to fact to affirm that the neural, muscular, glandular as well as all other action phases of any behavior are simultaneous in their functioning and that no system is prior to or more important than any other? What actually happens in every psychological behavior is that the organism performs an act of which all the component systems are phases, in the sense that they constitute factors of a total response. In their aggregate these phases constitute an adaptation to some object or situation. But apparently we have dissipated the cause of the adjustment. What, it is asked, if not the neural

[7]In various experimental procedures we may of course consider either the neural or muscular acts as prior.

apparatus, conditions how the muscles, glands and other phases of the reflex should act?

To this we answer: what in fact could be the cause of which the total (neural, muscular, glandular) adjustment is the effect but the stimulus object or situation, for in general what other observable causes of our actions are evident? Again let us stress that a reflex action represents a differential mode of behavior, neural, muscular, glandular, etc., which the organism has acquired in the course of its development and which now operates when its adequate stimulus is presented. The failure of reflex descriptions is largely owing to the fact that psychologists do not recognize the dependence of reflex action upon actual stimulation, exactly as is the case in any other psychological action. When we do appreciate the relationship between the stimulus and the total unitary response then we can cheerfully dispense with the causative character of the neural apparatus.

Now here another objection may be anticipated. How can we argue that the neural factor is not primary in importance nor prior in time when we know that as a matter of fact the essentially conductive function of the neural apparatus requires some time to operate, no matter how brief? Such an argument, we reply, rests upon a misconception which can be obviated by a closer observation of facts. Of a surety when we experiment upon a neuro-muscular coordination we may with perfect propriety disengage logically the conducting from the contracting mechanism, but when we do perform such a logical analysis we must not forget that such an experiment implies the falsism that the mechanisms are both inactive at the inception of the experiment, when in fact both nervous and muscular mechanisms are functioning before the experiment is started, since the organism is never at rest. Further, this objection implies that a single neural impulse can be in fact isolated and that it can be traced from a receptor to a muscle or gland. Now it is incontrovertible that a psychological organism is constantly in action and therefore neural impulses are discharging uninterruptedly over all the tracts in synchronous harmony with muscular, glandular and other types of processes. What in actuality happens when we present the organism with a stimulus is a redistribution of action, an emphasis of other features of the person than were prominent when the new stimulus appeared, in short there is a refocussing of the individual upon a new stimulus.

By way of emphasizing our hypothesis that if a reflex action is a psychological datum it is a segment of behavior, i. e., a stimulus and a response, we mean to deny as stated before that a reflex is a partial reaction in any sense. In especial, we mean to controvert the three typical forms of the decurtation theory

concerning reflexes which are found in psychological and physiological literature. (1) Reflexes are not primarily neural circuits in the sense of concatenated neurons or the operation of such circuits. (2) Neither are they exclusively activities of the complete nervous system. (3) Nor are they merely neuromuscular or neuroglandular responses. Again, we return to the charge: reflexes are complete or organismic adaptations to specific or adequate stimulating objects and circumstances.

Lethal is the blow dealt to all neuronic abstractions by the fundamental facts of neural physiology. No question exists at all but that the nervous system functions as a unified whole,[8] and while the neural abstraction may be useful for experimental purposes, as our quotations from Sherrington indicate, physiologists and neurologists are not insensitive to the factitious character of the neural circuits. To the writer it appears most extraordinary that psychologists who are not benefited in the slightest by neural abstractions but on the contrary are seriously hampered by them in their studies, still persist in their employment, whereas even the physiologist uses them only as convenient fictions.[9]

From the experimental work on neural physiology we believe that we derive substantial support for our organismic view of reflexes. What do we learn from spinal and decerebrate animals? Certainly not that organisms can function in parts. On the contrary, what we learn from laboratory animals is that a truncated organism can perform comparatively simple activities. This fact is amply demonstrated in the classic descriptions of Flourens, Bouillaud, Schrader, and others[10], when we forget their futile arguments about "consciousness" and its seat. Especially well brought out is this fact of truncated action in Munk's distinction between sensorial and psychic blindness.[11] It is because animals are simpler in their organization that the vivisectional experiments can be performed upon them without destroying entirely their capacity to act. By no means must we believe that a transsection or extirpation indicates that the animal can function in parts because some of its behavior is mental and some merely neural. No, the fact is that experiments can only be made up to the point of not disturbing the intrinsic functional organization of the animal. For this reason, exper-

[8]Cf. Sherrington, op. cit., 114; Herrick, An Introduction to Neurology, 1920, 60, 69, and elsewhere.

[9]It is not unfair to say, then, that the neuronic theory of reflexes is not even a physiological but a histological hypothesis.

[10]For an excellent general summary of this work, see Luciani, Human Physiology, 1915, vol. 3.

[11]Luciani, op. cit., 599. Is not the difference between a sensorial and psychic reaction merely a variation in degree of adaptational complexity?

iments on the higher apes or the human being produce either "shock" or death. But as long as the functional organization of the animal remains undisturbed throughout all the mutilations it is as much a psychological organism as it ever was. No other view would ever have been held but for the assumption by most workers that consciousness was a force or power separate from, but paralleling exclusively, the cerebral functions, or was co-ordinate with other neural functions, as Pflüger, Goltz, and Lewes believed.

We find in the reflex controversy,[12] as well as in the facts which the contending parties sought to interpret, considerable evidence for our contention concerning the unitary character of psychological behavior. Both the mechanical and spontaneity arguments are of course partial views, as the facts employed in them amply testify, and are not nearly as much descriptions of those facts as they are metaphysical interpretations. Both views are frankly based upon a psychoneural dualism, the existence of which we unqualifiedly deny. That the organismic theory is sound may be further seen from the fact that in the human organism much reconstitution and substitution of behavior may occur during and because of the degeneration of cortical tissue,[13] although the extreme intensity of the general functional organization is such that few liberties can be taken with the individual because of destroying the animal's organization.[14]

VI. *The Origin of Reflex Behavior.* From the standpoint of genesis, reflex responses are unique among the permanent behavior equipment of human beings, in that they may be considered as the earliest and most intrinsic of all the types of responses. The simplest of them are organized and operate considerably before the completion of gestation. Exactly does this fact comport with the function and general behavior conditions of these comparatively simple but utterly essential activities. Reflex behavior is essentially life-maintaining activity and therefore is most intimately related to and dependent

[12]Cf. Lewes, The Physical Basis of Mind, 1895, Problem IV.

[13]Franz, Cerebral-Mental Relations, Psychological Review, 1921, 28, 81; Variations in Distribution of Motor Centers, Psychological Review, Monograph Series, 19, No. 1; Brown and Sherrington, Note on the Function of the Cortex Cerebri, Proc. Physiol. Soc., Mar. 15, 1913; Journ. of Physiol., 1913, 46, xxii.

[14]Excellently illustrated is the highly integrative character of the human responses by the phenomena which Head and Riddoch (Brain, 1917, 40, 188-263, 264-402) have called mass reflexes. It appears that when the human cord is transsected the reflex responses of the individual which are found after the shock subsides are greatly reduced in functional complexity and effectiveness. Naturally we cannot agree with Rivers (Instinct and Unconscious, 1920, 28) that these reflexes are "suppressed" actions.

upon the biological structures of organisms. Hence, reflexes absolutely must begin to operate from the very inception of the organism's life; in fact the reflex reaction systems may be said to be inherited (if this can be said of any response system) along with the specific organs which have a part in their operation. So elementary and primary are some of the simple reflex responses that as a general rule the impression is prevalent that all reflex reactions are congenital and that none of them are acquired in the life of the person. Such an assumption is not strictly correct. To account for the essentially adaptive character of such basic and undeveloped reactions which are not inappropriately named protective, defensive, avoiding, and seeking responses, we must fall back upon some sort of natural selection hypothesis.

Need we add that neither the mode of origin of reflexes nor their essential features of permanency and constancy deprive such responses of any specific psychological character? Let it be noted that the psychological domain comprises behavior covering wide ranges of complexity and effectiveness, but significant is the point that all these types of reactions are determinate responses to stimuli, whether the adaptation involved be complex and imply much previous contact with its stimulus or whether the reaction be fairly simple and occur while the organism is in primary contact with the stimulus calling out the act in question.

It is possible that the basic character and primitive origin of the reflex responses contribute no small share to the constancy and permanency of these reactions. That is to say, as long as the type of organism remains unmodified and as long as the reciprocal stimulating circumstances remain the same, then there is no need for the variation in the response system.

VII. *Distinction Between Human and Animal Reflexes.* Because of the comparative simplicity of reflex action it is doubtless true that the slightest variation exists between human and infrahuman behavior at this point. And yet if we were to overlook the enormous differences that after all exist between human and animal reflexes we should do irreparable damage to our observations as well as our interpretations. For there are great differences even between the various reflex actions of the human individual, depending upon size, weight, health, and maturity, which cannot be neglected in any analysis of behavior, especially if we are to attain exactitude in our descriptions. From the existence of the different reflexes in the human species it follows that there must be extreme variations in the behavior of the individuals of the human and infrahuman developments.

In support of the proposition of the wide variation between human and infrahuman reflexes two sorts of considerations

suggest themselves. First, not only the general biological differences between the two species of animals but also the specific neural disparity argue conclusively for great diversities between the two types of reflexes. The second and more striking consideration is the general fact of behavior equipment. If our hypothesis is valid that a reflex act is a specific type of organismic adaptation, then clearly the behavior must be colored by the total reactional condition of the individual. In other words, the reflex action in the human being must be a function of the entire behavior equipment of the person[15], and the specific surrounding circumstances. Now obviously the behavior equipment of the person is so different from that of any infrahuman animal that the reflex behavior as well as any other class of action will be very different in the two cases.

Whatever argument is offered for the continuity of the two series of reflexes must perforce be based upon continuity in biological development. Now such continuity, it must be observed, does not imply any similarity in specific acts of psychological behavior; rather the argument for continuity overlooks all actual facts of concrete behavior in favor of a general developmental or descent hypothesis. Such a neglect of the specific adjustment inevitably results in error. To illustrate, it was only because of a lack of interest in actual adjustments that the believers in continuity attempted to make of spinal reflexes the typical reflex action to the exclusion of cerebral reflexes, and moreover, they believed this in disregard of the fact that even when reflexes are considered as neural mechanisms they are cortically controlled and modified.[16] In view of the cortical control of reflex action who can deny the distinction between reflexes which we are attempting to make? In concluding this section of our paper we might suggest that our distinction between human and infrahuman reflexes in no wise interferes with the biological continuity doctrine. For the logical implication of our hypothesis is that only a degree of difference exists between any two levels of psychological action. In consequence, it is our argument that animals are not different from human beings in lacking memory, thought and language, as the textbooks would have it, but only in the capacity to respond with simpler memory, thought and language reactions. But note, that in all cases of behavior the needs of psychology dictate a careful and accurate differentiation and description of responses.

[15]How potent is the behavior equipment of the organism in influencing its actions may be well observed in the illustration which Whitman quotes of the pigeon reared by a wholly different species which will reject a mate from its own species in favor of the species under which it was reared. Cf. Orthogenic Evolution in Pigeons, vol. 3, The Behavior of Pigeons, 1919, 28, edited by Harvey Carr.

[16]Cf. Herrick, Introduction to Neurology, 1920, 68, 120, 312.

VIII. *Types of Reflex Action.* For practical purposes we might classify reflex reaction systems into at least five types, partially upon the basis of their organization and especially upon the kind of contact which they effect with their ordinary stimuli. In general, reflexes may be adjustments to conditions (1) within the organism, or (2) to changes surrounding the individual or (3) to both of these at once. The first type we may name the interoceptive reflexes and we may mention as illustrations of such responses the stomach and intestinal reflexes, etc., or expressed differently, responses in which these phases of the organism play a prominent part.

On the other hand, reflexes which are primarily adjustors of the person to outside stimuli we may call exteroceptive actions. Here we may analyze two types which we will name localized and general exteroceptive reflexes respectively. In the former type the response appears to be localized in a definite way and involves primarily external skeletal mechanisms. As examples of these reflex actions we may name the hand, foot or body withdrawal responses to heat or pain objects, the knee jerk, turning the head toward a flash or sound, etc. The latter type, i. e. general reflexes, contrasts with the local responses in that a larger phase of the organism is saliently involved and also in the fact that the visceral and glandular factors may dominate the segment of behavior. As examples of the general exteroceptive reflexes we may quote writhing, trembling, shivering, etc.

The third class of reflex which adapts the individual to both external and internal stimuli we will call combination reflexes; these we may likewise analyze into two types, local and general. The former type would comprise adjustments of a more or less restricted sort, although on the whole the reactions would be more complex than those in our second class. Among the localized combination reflexes we may enumerate the sexual and salivary responses. In this class both the local and general responses may involve much glandular activity although the latter involves so much more of the visceral and glandular factors that we may refer to some of them at least as feeling reflexes. Illustrative of the general combination reflexes are the "startle" and "start" responses which are frequently confused with feeling and emotion reactions, and which in some cases constitute the simplest form of attention acts.

It is plain, of course, as we have indeed suggested, that the specific reaction systems in these different types of reflexes will be integrated from specific factors. For example, the principal interoceptive reflexes as a rule will include mainly both muscle and glandular factors while the exteroceptive reflexes involve primarily the skeletal muscles. Again, practically all

the interoceptive and some of the exteroceptive reactions will involve the sympathetic nervous apparatus in a prominent way, while the exteroceptive reactions will involve mainly the central nervous system. A prominent exception to this rule is the iris reflex in which the muscles involved are innervated by the sympathetic system. In such comparatively simple reactions as reflexes the discriminating factors would naturally be, as we have already seen, the simplest found in any reaction. In all of these cases, to be sure, the discriminating factor strictly speaking is nothing more than the occurrence of a simple differential response to its specific stimulus-object. As in all cases of classifying reactions the divisions and subdivisions that we have made represent only attempts to order behavior and not the separation of unequivocally different responses. For this reason no classification can avoid many overlappings and the value of any classification may be judged most adequately by the criterion of whether it suggests the likenesses and overlappings of behavior types or whether it serves to obscure such similarities and transcursions of the classes.

IX. *The Stimulation and Conditioning of Reflex Action.* A radical change in the view concerning what constitutes the stimulus for reflexes is implied in the acceptance of the organismic hypothesis. For if we assent to the view that reflexes are adjustments of the individual some of which are very complex, then we can no longer entertain the notion that they are aroused to action by merely simple thermal, light or sound radiation. Aside from the general confusion which this notion implies between the media of stimulations and stimuli objects or situations,[17] such a view in the domain of reflexes excludes all but the simplest situations as stimuli.

Let us notice then that reflex action is stimulated as are all other kinds of responses by objects of various sorts, and by circumstances and situations. To be plainer, human reflex actions are rapid and localized responses to things, persons, and conditions. Now this way of describing the reflex situation allows for the fact that the whole person is acting and not a single part of him, which is of course an impossibility. Moreover, this mode of analysis forestalls the tendency to overlook any type of reflex response, since we may be entirely certain that the class of reflex action is large enough to include more than the very simplest avoidance responses. How complex and varied the stimuli for reflex actions actually are appears clearly in the consideration that objects in particular settings will elicit

[17]For a distinction between stimuli and their media, cf. Kantor, A Tentative Analysis of the Primary Data of Psychology, Journ. of Phil., 1921, 18, 257.

the salivary reflexes while the same objects in different settings or different objects in the same settings will not bring out the reflex adjustment. What more complex stimulus can there be than the actions which operate while we are reflecting upon or reading of some person or event which excites us to sex or hunger functioning? Extremely informing also are the observations concerning the reflex changes in the person while under the subtle social and sex stimulation of other persons. Especially important here are the complex social objects and situations which constitute the stimuli for intricate human reflexes of all sorts. As among such social situations we may refer to games and gatherings of persons of the same or opposite sex which arouse sex and hunger responses of various degrees of diffusion. Again, we are familiar with the revulsion responses which dead or live animals produce in us when touched or seen; these are all complex reflex responses representing functions of the total reaction equipment of the person to customary stimuli which are therefore social in nature.

In the last mentioned reflex adjustment as well as in many others we meet with the very important conditioning activities influencing the adaptation of the person to his surroundings. Thus, for example, the nauseous visceral responses to dead animals may have become definitely attached to this new or accessory stimulus at some specific time and under particular circumstances. The early stages in training an infant to perform proper excretory behavior is in great part a process of attaching reflexes already present and functioning to a new eliciting stimulus.[18] Especially subject to the conditioning process are the combination reflexes, since the internally stimulated act can be variously transferred to and from the coordinately stimulating external object. So involved are the conditioning processes that in many cases it truly appears that the reflexes have become integrated into more complex forms of behavior, although as a matter of fact this type of response remains practically in its original condition throughout all of its complication by attachment to various new forms of stimuli.

X. *Reflex Action as Stimuli and as Behavior Setting.* So intimately related are the reflexes with the total behavior of the organism that they constitute the stimuli to many of our reactions. Because of this intimate relation, however, the reflexes are frequently overlooked and their importance unsuspected. As a consequence psychologists are frequently guilty of the assumption that mysterious powers bring about various reactions, whereas a careful study reveals that the reactions in

[18]This conditioning process may antedate the development of the necessary inhibitions.

question have definite stimuli in the reflex responses. There can be little doubt that reflex stimulation is responsible for much of our action which we call diffuse feeling-responses and moods and that they compose elements in our complex social acts; acts of love, pity, revenge, etc. may be due in large measure to reflex stimulation.

To state it otherwise, the reflex stimulations comprise some of the facts referred to as mixed motives in complex responses. Can we deny that it is through the accessory stimulation of reflexes, in addition to thoughts and memories aroused by tales of cruelty and violence, that we are induced to add our contribution to alleviate the suffering of which the stories inform us? In further illustration of reflex stimulation we may quote the ways in which our reflex responses color our reactions to aesthetic objects. Thus through the operation of these by-play reflex reactions we are stimulated to read human and personal qualities into physical objects stimulating us. In many instances the additional stimulation by reflexes may also supply energy and alacrity to the behavior. This latter fact has been celebrated in the statement that artistic production is the sublimation of sex impulses. While the term sublimation hardly represents a psychological process, still it does serve to emphasize the prevalence and power of reflex stimulation. In all these cases, reflexes serve as adjunct or additional stimuli and as a result of their operation the individual may act in an entirely different way than if he were stimulated only by the original object. Suggestive it is to note that the way we respond reflexly to things and persons in turn stimulates our first impression reactions to those things and persons. In other words, reflexes of a complex sort are called out in us by things and people and then when we attempt to formulate a judgment of these things and people, or if we merely are prepared for some future response, the delayed action is based and dependent upon reflex responses.

Furthermore, reflexes may function as combination stimuli-responses in delayed reactions, which function in general is made possible by the fact that series of reflex responses intervene between the presentation of the stimulus and the final adjustment, and thus function in many cases to keep alive the effect of the stimulation until the final response occurs. The combination reflex act-stimulus is undoubtedly a primary basis of the wants and desires as psychological facts. One is forcibly led to this view by the consideration of the place of sexual and hunger-digestive reflexes in food and sex wants and desires. So potent are the reflex actions as stimuli, that we can elicit from a careful study of the differential frequency and intensity of such reactions much valuable information concerning the type differences between individuals which are usually consid-

ered as temperament, disposition, etc.; such characteristics being marked by actions which in a large measure are stimulated by reflex responses.

And finally, the visceral and glandular reflex behavior of persons may serve not as direct stimuli to actions but rather as the setting of responses. That is to say, these reflex responses serve as influences of behavior affecting the general condition of the person. As the setting of stimuli, visceral reflexes determine whether or not certain stimuli shall be potent and call out a reaction. Thus for example, during the operation of hunger reflexes it is more difficult than otherwise to attend to one's work; in other words, the sensitivity to exacting stimuli is decreased; in other cases the functioning of reflexes may serve to increase one's sensitivity to particular stimuli and in consequence the person will respond more readily to surrounding objects.

XI. *Reflex Action and Instinctive Behavior.* Very prevalent is the view that reflex actions are closely related to instinctive behavior and especially is this assumption made in order to provide a solid foundation for instincts. In detail, instincts are presumed to be combinations or chains of reflexes, and since the latter are supposed to be specific neural pathways the conventionally teleological instinct achieves a factual support. From our standpoint, however, the relationship requires reformulation, since we cannot assign to instincts any sort of teleological character nor can we consider reflexes to be merely neural mechanisms.

Instinctive actions we consider to be behavior segments of a different order and type than those of reflexes and the main difference is that the instinctive behavior segments contain more than one reaction system.[19] Common to both instincts and reflexes, however, is the fact that both acts constitute definite final adjustments although an instinct segment of behavior contains a pattern of several reaction systems. Because the instinct segment of behavior does contain more than a single reaction system, it partakes of a series of definite characteristics not found in the reflex segments. These characteristics we may enumerate as follows: (1) spontaneity and variability, (2) modifiability, and (3) integration.

(1) By spontaneity and variability we mean to refer to the greater adaptability which instinctive behavior exhibits than do reflexes. The latter may be conditioned in various ways; that is to say, the simpler reaction system can be differently attached to a stimulus, but the response factor itself does not vary. In

[19]Unquestionably the fact that these reaction systems are morphologically exactly like those of reflexes constitutes the factual basis for saying that instincts are chains of reflexes.

the case of the instinctive reaction on the contrary, the members of the pattern may rearrange themselves in modification of the pattern.

This arrangement is made possible by the fact that while the total pattern may be stimulated by a definite appropriate stimulus, say some interoceptive reflex, the individual reaction systems in the pattern are aroused to action by other surrounding stimuli, namely, objects and conditions; so that each has some autonomy and the whole pattern is spontaneous. Accordingly, the instinctive behavior act is the more adaptable response when the adjustment conditions are more variable. This type of instinctive adjustment in which the member reaction systems are subject to rearrangement is the most spontaneous that we can observe. The reactions which are less spontaneous are so because the member reaction systems of the segment are only very little stimulated by the surroundings and more by the preceding members of the pattern series. It was this kind of instinct, no doubt, which gave rise to the notion that instincts are chains of reflexes. When there is only one, or at most only a few surrounding stimuli conditioning the instinctive behavior, then the reaction as a whole will be more rigid and conform to a type.

(2) Since the individual reaction systems in an instinct behavior segment are correlated with specific external stimuli it is entirely probable that the auxiliary stimuli may become more and more effective as factors in the total response, thus modifying in a specific way the total instinct act and making it more serviceable to the organism in its particular surroundings. This modifiability contrasts with the permanence of the reflex behavior segment which cannot of course be modified in any essential degree.

(3) Another intrinsic characteristic of instinct acts is the fact that when conditions allow and make necessary they become integrated into more complex reactions. It is this fact of integration above all which marks off the human from the infrahuman instinctive behavior and also distinctly differentiates instincts from reflexes. While the reflex activities remain practically as they originally appear, instinct behavior becomes developed into more complex forms of responses. And so it happens that in the animal domain the instinct reactions become integrated to only a slight degree because the conditions are not conducive to any considerable development. In the human individual on the other hand, the behavior conditions are so complex that there are very few instinct responses to begin with and these few become integrated into larger reactions and disappear. By the same token the reflexes which originally comprise

elements in the behavior equipment of the individual remain with him in practica'ly the original number and condition. We might repeat here once more that reflexes become modified only by conditioning, that is to say, the correlated stimuli may vary and consequently the whole behavior segment becomes altered but not the response factor or reaction system itself. It is consequently clear that in our comparison of reflexes with instincts, animal instincts must be understood to be the facts discussed, while in the case of reflexes both animal and human actions may be considered as the subject matter in question.

Superfluous it would seem now to add that in our entire discussion we referred not in a single sentence to instincts in the sense of a purpose or impulse in the individual to do various kinds of acts; no such impulses, we firmly believe, exist in any sense.[20] Many times we have implied that we are discussing only action mechanisms which are constituted exclusively of definite adjustment acts conditioned by stimulating circumstances with which they are coordinated.

XII. *Reflexes and Tropismic Action.* As a final consideration of reflex action we may place it in comparison with tropismic or purely biological action. Since there is no strict convention governing the use of the term tropism, let us be understood to exclude the criterion, that such action does not involve systematized nervous tissue. For our hypothesis concerning the adjustments of organisms does not permit us to seek in the mechanisms of organisms for the exclusive conditions of behavior. Now observe that very prominently is the comparatively simple mechanism of the tropismic action correlated with the sensitivity of the organism to its surroundings. As a matter of fact it is possible to differentiate between reflex actions as typical psychological responses, and tropisms, on the basis of the relationship of the organisms to the surroundings when they are performing either one or the other type of action.

Although it is entirely probable that the difference between tropisms and reflexes is merely a variation in developmental complexity, still we can specify particular adjustmental differences. For example, tropisms as responses, while entirely disproportional to the exciting condition in the expenditure of energy, in form and type of movement are still constant. This constancy of movement is a function of

[20]But this is no sufficient reason, however, for doing away with the name instincts as some recent discussions of instincts seem to imply, since we believe the term may reasonably be used to symbolize some definite form of psychological phenomena.

definite organic structures operating as a whole in the manner which is referred to as irritability, and correlates exactly with some stimulating condition in the surroundings. This external condition is practically an undifferentiated condition and never an object with its specific qualities. Moreover, the reactions are such as maintain the present status and condition of the individual's organization exclusively by means of metabolic functioning. From this standpoint it is easy to see why we must look upon tropismic action as relatively simple responses to surrounding conditions.

Reflexes as psychological activities, on the other hand, are specific responses to particular objects and conditions. Such behavior, as we have seen, constitutes differential responses and exhibits a subtle interdependence of stimuli and responses. By virtue of the person's possession of numerous characteristically different reflex action systems to which many different specific objects and conditions are coordinate, the individual is selectively sensitive to many features of the *milieu*. That this essential psychological character of reflex actions has been overlooked may be accounted for by the fact that many of the specific differences between reflexes and tropisms seem to fall away when we compare them both with the higher developed and more complex adaptations which we may call volitional responses. Such an overlooking of the definite psychological character of reflex action is exceedingly unfortunate, of course, since as a matter of fact reflex responses can be shown to partake in some fashion of practically all the typical characteristics of the complex psychological reactions.

XIII. *Conclusion.* In conclusion, we might suggest that our study of reflex action finds its most important feature in the general psychological problem which it raises. How shall we look upon psychological phenomena? Shall we consider them as definite autonomous facts in nature or shall we look upon them as merely epiphenomenal attachments to such facts? Or, again, shall we try to make psychological facts into physiological actions, because presumably psychological activities are not concrete or simple enough to handle without changing them into neural terms? In our study the conclusion we reach is that unless we consider reflexes as well as every other type of reaction as definite psychological facts, and not physiological acts, we cannot hope to understand them. That psychological acts are just as definite and just as real as any other kind of fact investigation has amply revealed. A definite criterion for a psychological fact we have discovered in the intricate interconnection between a stimulus and a total reaction of an organism.

Applying this criterion to reflexes we have found that such behavior must be considered as definite psychological phenomena, and further, we find that to study reflex actions as definite psychological facts not only enables us better to understand them but to appreciate the place they take in the adaptations of the organism, both as responses to specific stimuli and their settings, and as themselves stimuli and reactional backgrounds for our more complex behavior.

FUNCTIONAL PSYCHOLOGY AND THE PSYCHOLOGY OF ACT: II.[1]

By E. B. Titchener

§5. We have now to set a new scene. For while the psychologist of function works, as we have shown, in a biological atmosphere, the psychologist of act, with whom we have next to deal, lives and moves in an atmosphere of logic or theory of knowledge. Functional psychology—so we might say, twisting Fechner's famous phrase—is a psychology from below, a psychology to which we work upward from the more fundamental science, and the psychology of act is a psychology from above, to which we work downward from the superior discipline of logic.

'Function,' Ladd remarks, is "a vague and sufficiently indefinite term,"[2] and the statement holds, unfortunately, of biology as well as of psychology. 'Act,' on the other hand, is a term which, whether it occur in logical or in psychological context, may be defined with some rigour. If we cannot frame a definition at the outset, the fault lies not with any ambiguity of 'act' itself, but with the multiplicity of contexts in which the technical term appears. We shall do best to proceed chronologically, and thus to obtain materials for a retrospective survey.—

The importance of the 'act' in modern psychology derives from the work of Brentano. And we may begin by quoting the sentences in which Brentano distinguishes psychical from physical phenomena.

"Every psychical phenomenon is characterized by what the scholastics of the Middle Age have termed the intentional (or, sometimes, mental) inexistence of an object, and what we (although the expressions are not wholly free from ambiguity) should term reference to a content, direction upon an object ('object' not meaning here a 'reality'), or immanent objectivity. All alike contain within them something as their object, though they do not all contain the object in the same way. In idea something is ideated, in judgment something is accepted or rejected, in love something is loved, in hate hated, in desire desired, and so on.

[1]Continued from this Journal, xxxii., 1921, 519 ff.

[2]*Philos. of Mind*, 1895, 300.

"This intentional inexistence is the exclusive property of psychical phenomena. No physical phenomenon shows anything like it. And we may accordingly define psychical phenomena by saying that they are phenomena which intentionally contain an object."[3]

Physical and psychical phenomena, the subject-matters of physics (in the widest sense) and of psychology, are thus differentiated by means of the character of intentional inexistence. Phenomena which 'intentionally contain an object,' are however in Brentano's terminology, 'acts;'[4] and psychical phenomena are consequently, one and all, 'psychical acts.'[5] Their 'contents' are primarily physical (sensory and imaginal contents are, for Brentano, physical objects), and secondarily psychical, *i. e.*, other acts or unitary blends of other acts. The acts themselves fall into three irreducible classes, ideating, judging, loving-hating, which represent our ultimate 'modes of being conscious.'[6] They stand, nevertheless, in the order given. By the tests of simplicity, independence and generality, ideation ranks before judgment, and judgment before loving-hating.

Brentano's special psychology was, as we know, never written.[7]

§6. Brentano claims, in support of his view of the psychical phenomenon, the testimony of a long series of psychologists, from Aristotle to Bain.[8] His definition of the psychical act is,

[3] *PES*, 115 f.; cf. 127, 133, 238, 250, 255, 260, 313. I have called attention in this JOURNAL (xxxii, 1921, 112, note 14) to Brentano's change of view regarding the reality of the mental object. The preface to *Von der Klassifikation der psychischen Phänomene* (1911, iv) declares: "Eine der wichtigsten Neuerungen ist die, dass ich nicht mehr der Ansicht bin, dass eine psychische Beziehung jemals anderes als Reales zum Objekt haben könne;" cf. 149.

[4] The term *Akt* is a translation of the scholastic *actus*, which in turn is a translation of the Aristotelian ἐνέργεια. It is likely to carry a suggestion of activity, in the sense of 'voluntary acts,' 'acts of kindness,' etc. The reader may therefore be cautioned to take it strictly as defined by the writer who employs it. "Der Gedanke der Bethätigung muss schlechterdings ausgeschlossen bleiben," writes E. Husserl (*Logische Untersuchungen*, ii., 1901, 358), —and then, a few pages later, slips into the phrase 'psychische Bethätigung' (427).

It is strange that the 1910 edition of R. Eisler's *Wörterbuch der philos. Begriffe*, s. v. *Akt*, has nothing to say of the act-psychology.

[5] For *psychischer Act*, see *PES*, 132, 162, 188, 202, etc.; *Act des Bewusstseins*, 296; *Vorstellungsact*, 231, 347; *Act des Vorstellens*, 103, 230; *Gefühlsact*, 189; *Act des Interesses*, 263; *Act der Liebe*, 322, 330. I have not noted *Urtheilsact*: if it does not occur, that is only because *Urtheil* by itself is obviously an act-name. For infinitives, see *e. g.* 208, 261 (*Vorstellen*), 214, 262 (*Urtheilen*), 263, 314, 329, 350 (*Lieben und Hassen*).

[6] *Weise des Bewusstseins*, 266, 295, 345.

[7] Cf. our introductory discussion, this JOURNAL, xxxii, 1921, 108 ff. The new matter of the *Klassifikation* (131 ff.) shows clearly that Brentano had not in 1874 thought out, even summarily, the contents of his projected second volume.

[8] *PES*, 233 ff., 260.

however, challenged, and on substantially the same ground, by Meinong (1899) and Husserl (1901). These critics point out that the 'content' and the 'object' of act, which are identified by Brentano, must in fact be kept apart. When I perceive a house, for example, I most certainly am not ideating my sensory contents (Brentano's physical object). I am rather ideating, by and through these sensory contents, a transsubjective object, namely, the house in question. Brentano's concept of 'immanent objectivity' is therefore not adequate to a descriptive psychology.[9]

The effect of this criticism presently appears in the psychological writings of the Meinong school. Höfler (1897) remarks that, while a theory of knowledge must discriminate content and object, psychology, whose object is always immanent, may dispense with the distinction.[10] But Witasek (1908) draws a less simple picture. Every elementary psychical phenomenon is now taken as twofold or two-sided, as at once act and content. There can be no act without content, and no content without act; the distinction is no more partitive than that of the colour and spread of a surface or the velocity and direction of a movement. Logically, however, the separation may be made, and psychologically—act and content are equally 'psychical'—separate treatment is, within limits, convenient.[11]

The 'content' of a psychical phenomenon is the 'part' whereby it brings a determinate object to consciousness, and the 'act' is the 'part' which makes the object an object of perception or imagination or judgment. The essential character of the psychical, the character that marks it off from the physical, is accordingly this reference to a transsubjective object, a transeunt reference to something beyond itself. In Witasek's own words:

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[9]A. Meinong, "Ueber Gegenstände höherer Ordnung und deren Verhältniss zur inneren Wahrnehmung," *Zeits. f. Psychol. u. Physiol. d. Sinnesorg.*, xxi., 1899, 185 ff.; E. Husserl, *Logische Untersuchungen*, ii., 1901, 344 ff. (esp. 353), 396 ff., 694 ff. A little later comes T. Lipps, *Leitfaden der Psychologie*, 1903, 53 ff., 139 (1906, 5 ff.; 1909, 8 ff.): cf. also "Bewusstsein und Gegenstände," *Psychol. Untersuchungen*, 1905, 1 ff., and "Inhalt und Gegenstand: Psychologie und Logik," *Sitzungsber. d. kgl. bayer. Akad. d. Wiss.*, 1905, 511 ff. The general statement of the text applies more closely to Husserl than to Meinong, who still speaks of immanent objects. Husserl, of course, recognizes the limiting case in which object and content coincide (333, 337 f., 352, 363, 376, etc.). But it is not my purpose at this point to enter into details. Nor have I thought it worth while to try to carry the distinction of content and object further back. Höfler's claim ("Sind wir Psychologisten?" in *Atti del V. Congresso Internazionale di Psicologia*, 1905, 327) will hardly hold water, in view of his own statements in the *Logik* (1890, 7) and the *Psychologie* (1897, 3): cf. Husserl, 470.

[10]A. Höfler, *Psychologie*, *loc. cit.*

[11]S. Witasek, *Grundlinien der Psychologie*, 1908, 73 ff., 280 ff., 318 f.

"My ideating, my thinking, my feeling and my willing are always in their own peculiar way 'aimed' at something. I ideate *something*, a something that is not the ideating, perhaps a book; my thinking grasps things that are not themselves thinkings, indeed, that do not belong to the mind at all; it grasps them, without in any way drawing them into itself; there is, and there can be, no suggestion of a spatial relation; and yet my thinking 'seizes' those things. The same thing holds of feeling and of willing. A relation, truly, that would be mysterious, nay, inconceivable, if we were not so familiar with it from our inner experience! But it is altogether confined to the psychical. Examine the physical, search the world of material things, as carefully as you may, and you will find not a trace of it. You will find relations of space (inside, outside, alongside), you will find movement to and from, you will come upon all manner of relations: but this—this intrinsic reference to, direction upon, pointing toward something else—has no place among them.... Here, we may believe, is the most tangible, most characteristic difference between the two spheres."[12]

Psychical phenomena still form a class of their own, separate and distinct from physical phenomena. But for Brentano the psychical phenomenon is an act, in which a content or object (which is primarily physical) is intentionally contained. For Witasek the psychical phenomenon is an act-and-content, whose nature it is to point to some object (very often a physical object) that lies beyond it.[13]

The elementary phenomena of Witasek's system are, on the 'intellectual' side of mind, ideas and thoughts, and on the 'affective' side, feelings and desires.[14] Brentano's loving-hating has thus been subdivided.

§7. At the same time that Meinong and Husserl criticise Brentano's definition of act, Münsterberg (1900) objects that the specified acts are not logically coordinate. Brentano, as we saw, gives priority to the act of ideation: "[all psychical phenomena] either are ideations or.....rest upon ideations as their basis."[15] Münsterberg argues that this ideation is not an act at all. An act is an attitude of the subject, an attitude in which we say Yes or No to a presented object or content.[16] Judgment, for example, covers the paired opposites of acceptance and rejection, affirmation and negation, and interest the paired opposites of loving and hating. But where is the activity, the Yea-saying or the Nay-saying, in the case of ideation? "We speak

[12] *Ibid.*, 3 f., 74.

[13] I am not quite sure of this interpretation. Witasek seems to say expressly (75) that the reference of the psychical phenomenon is an affair of act, and therefore not of content; and all the terms employed in the quotation just given are, as my rendering shows, names of act, and not of total psychical phenomenon. Yet the content is psychical (5, 74).—For the physical object, cf. *ibid.*, 6, 12, 73 f.

[14] *Ibid.*, 81. Witasek's doctrine of processes and dispositions does not here concern us.

[15] *PES*, 111; cf. Höfler, *op. cit.*, 3 f.; Witasek, *op. cit.*, 97. Husserl's discussion (*op. cit.*, 399-463) will engage our attention later.

[16] H. Münsterberg, *Grundzüge der Psychologie*, i., 1900, 19 f.

of an Ideating," declares Brentano, "whenever something appears to us (*wo immer uns etwas erscheint*)."[17] The implication is that we are brought indifferently, apathetically, into the ideational state, and in that event there can be no question of an 'act.'

Münsterberg would, undoubtedly, have urged the same objection against Witasek's system. For here, also, we find a recognition of the Yes-No attitude in all the elementary phenomena except ideation: in thought (affirmation and negation), in feeling (pleasantness and unpleasantness) and in desire (wanting and spurning.)[18] Witasek declines to give a formal definition of ideation, and contents himself with examples. He sums up his discussion, however, in the remark that ideas, the wholes of act-and content, are "so to say the psychical copies (*Bilder*) of the objects with which our consciousness is occupied."[19] We need not press the language, but we get, again, the suggestion of indifference on the part of the subject. Moreover, Witasek asserts categorically that "the antithesis of Yes and No is altogether incommensurable with ideation."[20] In what sense, then,—so Münsterberg might have asked,—is ideation an 'act'?

The criticism is telling: but it hinges, of course, upon the definition of act. That is a matter to which we shall presently return. Meantime, it is interesting to note that the objection has been turned by a writer who could not admit its validity. It is turned by Stumpf, in his doctrine of 'psychical functions.'

§8. Stumpf finds that the 'immediately given' comprises three irreducibles: phenomena, by which name he denotes sensory and imaginal contents; psychical functions, which include such activities as perceiving, grouping, conceiving, desiring, willing; and the immanent relations between and among functions and phenomena.[21] All functions (with the exception of the primitive function of perceiving) have, further, their specific correlates or contents,—forms, concepts, objectives, values,—

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[17]*PES*, 261; cf. 106.

[18]*Op cit.*, 80, 280, 353.

[19]*Ibid.*, 97 f.

[20]*Ibid.*, 308; cf. *PES*, 291. This statement of Witasek's forbids us to read anything like selective attention into the phrases whereby he characterizes ideation: "[das] sich Präsentieren eines neuen Inhalts" (78), "[die] Vergegenwärtigung eines Gegenstandes" (98), etc. Attention, in fact, is treated both by Höfler (*op. cit.*, 263 ff.) and by Witasek (297 ff.) in the section devoted to Judgment. Stumpf originally followed the alternative road left open by Brentano and made attention a Feeling (*Tonpsychol.*, i., 1883, 68; ii., 1890, 279). Brentano himself would apparently (*PES*, 263) have taken a like course.

[21]C. Stumpf, *Erscheinungen und psychische Funktionen*, 1907, 6 f.; *Zur Einteilung der Wissenschaften*, 1907, 5.

which Stumpf calls collectively formations.[22] Phenomena, relations and formations, as objects of thought, give rise to the three neutral sciences of phenomenology, logology and eidology. These *Vorwissenschaften* taken together may, if we care so to apply the term, be named theory of knowledge.[23]

We have passed over the psychical functions, which come to their rights in another way. Since relations are common both to functions and to phenomena, the 'immediately given' shows an intrinsic duality.[24] We are led by it, though not directly, to the distinction of psychology and natural science. Phenomena form the starting-point for both,—the logically necessary starting-point for natural science, the empirically necessary for psychology.[25] The proper subject-matter of psychology is, however, to be sought in the psychical functions.[26] Throughout our actual experience, these are continually and closely connected with phenomena.[27] Stumpf insists, nevertheless, that the connection is not logically necessary. Though every function must have a content, the content need not be phenomenal. Moreover, even as empirically conjoined, functions and phenomena are independent variables. Their assignment to different sciences is further justified by their radical difference; they have no single character in common, unless it be the character of time.[28]

Psychical functions are also called acts, states, experiences.[29] Stumpf distinguishes, with Meinong and Husserl, between the content and the object of an act, but his distinction is differently worked out. An object is a conceptual formation. Hence an act that stands below the level of conception cannot have an object. In bare perceiving, for instance, we have phenomenal or relational contents, but no object. Conversely, when our thought is directed upon the universal as such, upon concept or law, content and object coincide; the content is, by its very nature, object. Between these limits stand all the cases in which we are occupied with a general or invariant (object) on the basis of a particular or variable (content).[30]

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[22] *Gebilde psychischer Funktionen*: cf. *Erscheinungen*, 28 ff.; *Zur Einteilung*, 6 ff., 32 ff.

[23] *Zur Einteilung*, 26, 32, 38, 40.

[24] *Ibid.*, 6, 10.

[25] So I interpret Stumpf. Cf. the definition of natural science, *ibid.*, 16, and the *notwendig*, *ibid.*, 6.

[26] *Ibid.*, 20; *Erscheinungen*, 6, 39.

[27] *Erscheinungen*, 7, 27, 38 f.

[28] *Ibid.*, 11 f., 15.

[29] *Ibid.*, 4 f.

[30] *Zur Einteilung*, 6 ff. I hope that I here express correctly the relation of *das Zentrale*, *die Invariante* of the conceptual formation to its casual accompaniments. Cf. also *Erscheinungen*, 16 ff.

What, then, are the psychical functions? Without professing to make out a complete list, Stumpf distinguishes two great classes, the intellectual and the emotive, and names certain functions under both headings.[31] On the intellectual side, the most primitive function is that of perceiving or remarking or taking note of: it includes the two modes of sensing and ideating.[32] Another fundamental function of the intellectual life is comprehension or grouping (*Zusammenfassen*), whereby "a number of discriminated particular contents, impressions of touch, lines, tones, can be combined into a whole, a figure, a rhythm, a melody".[33] Next follows conception (*das begriffliche Denken, die Bildung von Allgemeinbegriffen*), and last in order stands judgment.[34] On the affective side we have such paired opposites as joy and sorrow, search and avoidance, willing and rejecting.[35]

Here, where we have Münsterberg's objection in mind, we are especially interested in the primitive intellectual function of perceiving, which replaces the 'simple ideation' of Brentano's system. Perceiving or remarking is an intrinsically analytic, as comprehension is an intrinsically synthetic function.[36] From the standpoint of classification it would therefore be simplest to bracket these two functions together, and allow the opposition of analysis and synthesis to replace, in the ideational sphere, the Yes and No of the other functions. Stumpf himself seems to recognize such an opposition in the instance of conception.[37] Yet we are told that perceiving is 'most primitive,' so that it takes precedence of comprehension. Moreover, it is clear that the function has, by its nature as analytic, a negative as well as a positive implication of its own. While we are taking note of a part or attribute, while there is "an accumulation of consciousness over against"[38] this part or attribute, we are necessarily failing to take note of all the rest of the presented whole, from which consciousness to the same degree recedes or is withdrawn. "The barest act of attending or heeding," says Münsterberg, "is of itself an act of subjective evaluation, near akin to emotion, and fundamentally different from mere ideation."[39]

[31] *Erscheinungen*, 5, 7.

[32] *Ibid.*, 16.

[33] *Ibid.*, 23.

[34] *Ibid.*, 24 f.

[35] *Ibid.*, 26 f.

[36] *Ibid.*, 16 ff., 23.

[37] *Ibid.*, 25. Yet it is noteworthy that the illustrative list (7) runs: "*Zergliedern, Zusammenfassen, Bejahen und Verneinen, Begehren und Ablehnen*," without a connecting *und* between the first two terms.

[38] *Ibid.*, 17.

[39] *Op. cit.*, 20.

We may, then, read into Stumpf's view of the intellectual functions either a primitive antithesis of preference and neglect, or a prejudgmental antithesis of combining and dividing. There still remains a difference between these and the remaining acts: since on the one hand the neglect implied in perceiving is, precisely, implied and not overt, and since on the other hand both combining and dividing are, so to say, positive activities. In so far, however, as 'ideation' has ceased to be the purely indifferent entertainment of a content or object, in so far Münsterberg's objection has been turned. And it is difficult to believe that the turning is a mere matter of chance.

Yet we must insist that Stumpf could not admit the validity of Münsterberg's criticism. For, in the first place, he attributes a duality like that which Münsterberg reserves for acts to certain classes of phenomena, namely to the affective sense (*Gefühlssinn*) and the sense of temperature. He speaks of the 'twosidedness' of these senses,—pleasure and pain, warmth and cold.[40] But if the 'twosidedness' here is an accident of biological organization, so might it also appear accidentally and sporadically among the functions. A second consideration is, however, more important. Stumpf, we remember, finds the psychical functions in the 'immediately given.' He does not find a 'subject' along with the functions, and he formally declines to base his psychology upon the *Ichbewusstsein*.[41] But if the acts are by logical necessity two-faced, the necessity arises from their being acts of a subject.

§9. Let us see, then, if Münsterberg's requirement is met by a system which affirms the compresence of the subject, the 'I of consciousness,' in every conscious experience. Such a system is that of Lipps,[42] which we proceed, briefly and partially,[43] to analyze.

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[40]C. Stumpf, "*Ueber Gefühlsempfindungen*," *Zeits. f. Psychol.*, xliv., 1907, 22; "Apologie der Gefühlsempfindungen," *ibid.*, lxxv., 1916, 3, 32.

[41]*Erscheinungen*, 8f.

[42]Lipps' *Leitfaden* appeared in three editions (1903, 1906, 1909). The second edition, which is the most systematic of the three, is largely different from the first; and the third, which I here follow, differs in certain important respects from the second. Concurrently with these editions Lipps published memoirs and articles—expository, constructive, polemical — in which various phases of his system are worked out in greater detail (cf. the selected bibliography by G. Anschütz, *Arch. f. d. ges. Psych.*, xxxiv., 1915, 13). He was, indeed, continually revising and correcting, expanding and explicating, so that a later work is not only an improvement upon an earlier, but is also itself the starting-point of new insights and arguments. For this reason his psychology, as we shall see, never attained to systematic completion.

[43]In particular, we are not here concerned with Lipps' views of explanatory psychology.

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Psychology, Lipps tells us, is the science of consciousness and of the experiences of consciousness (*Bewusstseinserlebnisse*).[44] The peculiar function of consciousness is to reach out, beyond itself, into a world transcendent to it; this "jumping over its own shadow," as Lipps put it, is the very essence of consciousness.[45] The experiences are of various kinds.

Lipps begins by differentiating sensations, as 'objective,' from all other conscious experiences, which are 'subjective' or experiences 'of me.' Sensation is the mere 'having' of a sensory 'content.' This 'having' is a 'running against' or 'happening upon' (*Widerfahrnis*); the sensation is a 'receptive experience;' the content of sensation is given only to the 'eye of sense.'[46]

If now I turn my 'mind's eye' upon a content, I pass from receptive experience to an experience of 'activity.'[47] The term is technical: the experience of activity is a line or stretch of consciousness, which begins and ends with punctiform 'acts.'[48] In turning my mind's eye upon the content I start, so to say, with an act of 'hello!'; this act is drawn out into an activity of attention or apprehension (*Auffassung*); and the activity comes to an end, 'snaps to,' with an act which Lipps names the 'simple act of thought' (*den schlichten Denkakt*), whereby I disengage an object 'for me' or 'over against me' from the original content 'in me.'[49]

With the appearance of objects, consciousness becomes more complex. Not the 'eye of sense,' and not the 'mind's eye,' but the 'eye of intellect' (*das geistige Auge*) is henceforth in function.[50] I start with the simple act of thought, which is drawn out into the activity of 'apperception.'[51] But apperception is of two

[44]T. Lipps, *Leitfaden der Psychologie*, 1909, 1. The term *Bewusstseinserlebnis* has not settled down to its final definition. (1) An *Inhalt* is not an *Erlebnis*, but an *Erlebtes* (3). But in 1906 (3, 355) *Inhälte* were *Erlebnisse*. So in the index of 1909 (391) they still figure as *eigenartige Bewusstseinserlebnisse*. (2) In 1906 (8, 27) acts were *Erlebnisse*. In 1909 (21, 23) acts of thought are *Erlebnisse* only when their imaginal contents are adequate to the objects of thought, and acts of conation are never *Erlebnisse*, since we do not experience the objects upon which they bear. Yet the older mode of speech is sometimes retained (*e. g.*, 40). One does not see why acts (quite apart from the I-experience involved) should not be *Tunerlebnisse* (cf. "Das Ich und die Gefühle," *Psychol. Untersuchungen*, i.,1907, 693): but Lipps was apparently on the track of a new distinction which he had not thoroughly worked out. Meantime we must accept contents, acts and experiences as in strictness irreducible.

[45]*Ibid.*, 12.

[46]*Ibid.*, 7, 16, 20, 23, 27.

[47]*Ibid.*, 26.

[48]*Ibid.*, 22.

[49]*Ibid.*, 23; 14 f., 22, 25 f, 141 ff ; 13, 25; 9, 12, 13, 25 f.

[50]*Ibid.*, 8, 13, 25.

[51]*Ibid.*, 22, 25 f., 144 ff.

kinds: classifying and questioning. If it is of the classifying kind, I end it either by a simple act of 'fixation' of the intellectual eye, an act which constitutes my object a single, determinate, particular object; or else, passing beyond these acts of bare fixation, I bring it to a close by some act of comprehension, relation, abstraction.[52] If apperception is of the questioning kind, a further complication arises. The objects which I question reply to me; they have their own status and their own laws, in virtue of which they lay their pretensions or claims before me. And I may just 'listen to' and experience these claims, or I may acknowledge them. If I acknowledge them, the activity terminates in an act of judgment. In this case there is a direct parallel between apprehension, with its terminal act of thought, and apperception, with its terminal act of acknowledgment.[53] If, on the other hand, I only listen to them, I have what Lipps calls an 'experience of claim' (*Forderungserlebnis*). This is a receptive experience, and therefore akin to the 'having' of a sensory content. It is a feeling of dispositional tendency, of compulsion or constraint.[54]

The experience of claim plays a large part in Lipps' system. For the moment, however, we leave it aside, in order to characterize the 'acts.' These are punctiform 'doings' of the conscious I, and may occur either independently, as 'empty or naked' acts, or in connection, as the initial and final points of an activity. Lipps distinguishes various sorts of acts. There are acts of ideation (that is, of productive imagination), of thought, of conation, of judgment. 'Wishing,' for instance, is a naked act of conation. But since conation, whenever circumstances permit, extends from act to activity, we have acts which institute or inaugurate this activity, acts of impulsion, incitement, urge, and acts which round off the activity, acts of arriving, completing, succeeding.[55]

The mention of conation brings us back to the *Forderungserlebnis*. Consciousness or the conscious I, whose essential nature we have seen to consist in self-transcendence, is also identified by Lipps with activity;[56] and activity is always an act of conation (*Streben*) expanded into a conscious stretch.[57] But conation is itself the 'subjectified experience of claim:' it is, so to say, the resultant of two sets of tendencies, the tendencies imposed on the 'I' by objects, and the tendencies, directions, pressures, needs, resident at the time in the 'I,' or it is a claim's

[52] *Ibid.*, 26, 149 ff.
[53] *Ibid.*, 26 f., 30; 11, 31; 32 f., 189 ff.
[54] *Ibid.*, 31, 33, 34.
[55] *Ibid.*, 21 f., 33; 22; 21, 22, 23, 32, 42, 263, 296.
[56] *Ibid.*, 6, 39.
[57] *Ibid.*, 23.

'effective resonance' within me. If the tendencies are in accord, the experience is that of active conation; if the imposed tendencies run counter to the resident, it is that of passive conation. In any case, conation and activity are definable as the interrelation or cooperation of an object, with its claim, and the individual consciousness.[58]

If, however, consciousness is activity, what becomes of the 'receptive' experiences, and more especially of the 'having' of a sensory content? Lipps meets the difficulty by his doctrine of 'potential' activity. To 'have' a sensory content is to have it 'in my power.' I feel that I 'can,' if I so desire, turn toward it, direct upon it my activity of apprehension: or rather, since activity presupposes an object, that I can direct my apprehension upon the object implicitly or potentially contained in it. This distinction of actual and potential activity, though it is psychologically irreducible, is still a distinction within the general experience of activity, and thus guarantees the essential likeness of receptive and active experiences.[59]

To round out this summary account, we must say a word of two further classes of conscious experience. The one of these comprises the feelings proper, the affective feelings, which are 'states (*Zuständlichkeiten*) of the I,' 'colorings' of the activity that is consciousness.[60] The other includes the experienced relations. The resolution of consciousness into a series of acts and activities does not destroy its unity and continuity. For the acts and activities bring with them experiences of conditioning and being conditioned, of dependence, of procession or issuance; in experiencing them, we also and at the same time have experiences of 'motivation,' that is, of their relation to other conscious experiences.[61]—

Not everything in this account rhymes or, as Lipps might say, 'snaps to;' the thought is not of the kind that can properly be reduced to tabular form. We have, however, gained a basis for our special question: are the acts and activities two-faced, positive and negative? The answer seems, without a doubt, to run in the affirmative, though there is no evidence that Lipps offers it as the formal answer to a question of doctrine.

[58] *Ibid.*, 34 ff., 261 ff. Similarly in the acts of thought there is a "peculiar interrelation between the I and the objects," which makes the acts at once creative and receptive (21 f.).

[59] *Ibid.*, 14, 28 ff., 39.

[60] *Ibid.*, 37 ff., 40, 314 ff.

[61] *Ibid.*, 40 ff. In 1906 Lipps affirms that "just as conation and activity are an echo or a reflection of the claims [of objects] in the individual consciousness, so is the interconnection of conations and activities by motivation a reflection of the interconnection of claims" (29). This doctrine, and with it the reference to *Zusammenhang der Forderungen* in the index, have disappeared in 1909. Yet 1909, 300 repeats 1906, 266.

Conation, he says,—and we remember that conation is fundamental,—conation is "positive and negative, endeavor and resistance, wishing and wishing-not, willing and willing-not. The relation between the two is analogous to that between the consciousness of validity and the consciousness of invalidity, or between the positive and the negative judgment."[62] This passage recognizes the two-sidedness of activities (of activity or conation in general and of the activity of willing in particular),[63] of acts (wish and acknowledgment),[64] and of potential activities. For the consciousness of validity and invalidity belongs to the experience of claim, which is a receptive experience, like the having of a sensory content;[65] and this 'having' itself is a 'having in my power' to turn toward or to turn away from.[66] We may add that feeling, the 'tingeing' of our activity, shows the same dual nature; we find the antithesis of pleasant and unpleasant, large and small, familiar and strange, and so forth.[67]

Everything, therefore, except the contents[68] and the experiences of motivation, has the Yes-No character which Münsterberg demands.

§10. We began this discussion with the pioneer work of Brentano, and we have used the criticisms of Meinong and Husserl and of Münsterberg as pegs upon which to hang an account of certain act-systems. We have thus been able to set forth, so far as is necessary for future comment and comparison, the systems of Witasek (as representative of Meinong's school), of Stumpf and of Lipps. The central point upon which these psychologists agree is that consciousness is by its very nature intentional, that it transcends itself and refers to objects beyond

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[62] *Ibid.*, 260 (1906, 230; 1903, 203 f.). Lipps might have added to the negative judgment the negative perception and the negative recollection (201 ff., 212 ff.).

[63] *Ibid.*, 301 ff.

[64] *Ibid.*, 36: Lipps speaks of a feeling "des Anerkennens oder Abweisens, des Fürwahr- oder Fürfalschhaltens."

[65] *Ibid.*, 31.

[66] *Ibid.*, 13 f.

[67] *Ibid.*, 37 f., 314, 329, 332, etc.

[68] Lipps was not writing with Münsterberg in mind. For he compares the antithesis of pleasant-unpleasant with that of light-dark in the domain of color-contents (*ibid.*, 37, 314). The parallel is only casually drawn, but Lipps found it possible. In the account of the sensory contents (69 ff.) there is, of course, no hint of any *Gegensatz*.

it.[69] The word 'intentional,' however, reminds us that our survey is not yet complete. By the side of Meinong, Stumpf, and Lp ps we must place a fourth writer,—one who is not a psychologist, one indeed who believes that there is a great gulf fixed between his own science and psychology,[70] but one who has, nevertheless, exerted a profound influence upon current psychological thought.

Stumpf reserves the term 'phenomenology' for the science that deals with sensory contents and the corresponding images. Husserl's phenomenology is neither this phenomenology of Stumpf's nor is it identical with what is sometimes called 'pure' psychology: it is something wider and deeper than either.[71] All psychology, on Husserl's view,—and psychology includes for him the Stumpfian phenomenology,—presupposes the attitude of natural science; it is a science of fact, a psychophysics.[72] There is, on the other hand, a science of 'pure' consciousness in the sense of consciousness freed from bodily entanglement and naturalistic presupposition:[73] a science that has to do, not with fact, but with 'essence' (*Wesen*).[74] This science, with its method of 'immanent inspection' or 'contemplation of essence' is phenomenology.[75] To enter upon it, we exchange the naive and

[69]This statement must be judged in its context; were my intended book a history of contemporary psychology there would be much more to say. In a certain sense, for instance, Lipps is the direct antithesis of Brentano. At first, under the influence of Hume and Herbart, Lipps represented that 'psychologism' which Husserl attacks in the first part of his *Logische Untersuchungen*. Later he became a 'logicist,' but a logicist of the dialectic stripe, connected through Herbart and Fichte with Plato. Brentano was never anything but Aristotelian.—Meinong, Stumpf and Husserl are all directly related to Brentano. But they, too, have made their changes. It is a far cry from the Husserl of the *Philosophie der Arithmetik* (1891) to the Husserl of the *reine Logik*.

[70]E. Husserl, "Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie," *Jahrbuch f. Philos. und phänomen. Forschung*, i., 1913, 184: phenomenology is "von aller Psychologie durch Abgründe getrennt." Ten years before, the "rein deskriptive Analyse der Denkerlebnisse" which in psychology should precede explanatory or genetic endeavor is identified with phenomenological analysis ("Bericht über deutsche Schriften zur Logik," *Arch. f. system. Philos.*, ix., 1903, 114); and even in the *Ideen* (143, 159) a bridge is thrown across the abyss in the shape of an *eidetische Psychologie*. Messer ("Husserl's Phänomenologie in ihrem Verhältnis zur Psychologie," *Arch. f. d. ges. Psychol.*, xxii., 1912, 117 ff.; xxxii., 1914, 52 ff.) has done his best to placate the implacable.

[71]E. Husserl, "Philosophie als strenge Wissenschaft," *Logos*, i., 1910, 315; *Ideen*, 5, 121, 290.

[72]*Bericht*, 398, 400, 524 f.; *Philosophie*, 298 f., 302, 315; *Ideen*, 3 f., 8, 69 f. cf. O. Külpe, *Vorlesungen über Psychologie*, 1920, 22.

[73]*Philosophie*, 302, 315; *Ideen*, 57 ff., 94, 121 f.

[74]*Log. Untersuchungen*, ii., 18 f; *Philosophie*, 314 ff.; *Ideen*, 4, 7 ff., 114.

[75]"Immanentes Schauen:" *Philosophie*, 303, 313; "Wesenserschauung:" *Ideen*, 11, 43; "Wesensschauung:" *Philosophie*, 315 f. Cf. *Ideen*, 113.

dogmatic attitude of every day life and of natural science for a 'philosophical' attitude, which leaves visible only 'pure' consciousness in its 'absolute intrinsicality.'[76] And if we should rashly venture to transfer to the domain of descriptive psychology some result of the phenomenological scrutiny of essence, the responsibility is ours alone; Husserl washes his hands of us.[77]

Psychology, then, is the empirical science of mental facts as physics is the empirical science of material facts.[78] Psychology is concerned with 'experiences,' physical science with the 'non-experiences' to which experiences refer, with the 'intended objects' of acts.[79] And since natural science recognizes the individuation of organic life, these experiences are the experiences of an 'I.'[80] Consciousness, in the wide sense, therefore embraces the entire phenomenological make-up of the mental 'I', or consciousness is the phenomenological 'I' as 'bundle' or complication of psychical experiences.[81] In a narrower and 'pregnant' sense, consciousness is the inclusive name for intentional experiences or acts.[82]

The 'act,' it will be noted, is here identified with the complete intentional experience,[83] which includes both the 'content' (upon which the 'object' is based) and the 'intention' or 'act-character.'[84] Since, however, contents (in this narrower sense) are

[76] *Philosophie*, 302, 315; *Ideen*, 3, 46 ff., 48 ff., 94, 120 ff., 182 f.

[77] The thing can be done (*Bericht*, 400; *Philosophie*, 315; *Ideen*, 143), and on Husserl's own showing the psychologist has no choice but to make the attempt. It seems, however, that every psychologist who has so far ventured (even the well-intentioned Messer) has flatly failed. Happily for us, such failure does not greatly matter. We are interested in Husserl, less for his own sake, than for the way in which psychologists have understood him.

[78] *Bericht*, 398.

[79] *Log. Untersuchungen*, ii., 338 f.

[80] *Ibid.*, 336; *Bericht*, 399 f., 524 f.; *Philosophie*, 298, 312 f.; *Ideen*, 104.

[81] *Log. Untersuchungen*, ii., 325 ff., 350, 354 f.; *Ideen*, 65, 168 ff. (esp. 172). Stumpf's phenomenology, which we have accounted a part of Husserl's psychology, has its phenomenological counterpart in a phenomenological hyletics; and this, directly translated into psychological terms, becomes a chapter of eidetic psychology (*Ideen*, 178 f.). But Stumpf is an interactionist, and would hardly rule out psychophysics ("Eröffnungsrede," *Dritter internat. Congress f. Psychol.*, 1897, 7 ff.).

Husserl's emphasis upon inference (*Log. Unt.*, 331, 339) has led Wundt ("Psychologismus und Logizismus," *Kleine Schriften*, i., 1910, 570 ff.) to criticize him from the side of the 'unconscious.' For our immediate purpose this criticism is irrelevant.

[82] *Log. Unt.*, ii., 342, 345, 349; *Ideen*, 168, 174 f. Husserl's terminology has changed in the *Ideen*: for 'act' see *ib.*, 170.

[83] So, *e. g.*, *Log. Unt.*, ii., 323, 357, 362, 388; cf. A. Messer, *Empfindung und Denken*, 1908, 43.

[84] For the "primary contents" see *Log. Unt.*, ii., 652 (cf. 330, 345, 349, 360, 364 *n.*, 370 ff., 468, 471); *Ideen*, 172. For the 'basing' of the object, *Log. Unt.*, ii., 353, 361, 362, 363, 370, 393, etc. For 'intention,' *ibid.*, 323, 348, 357 f., 361, etc.

themselves non-intentional experiences, we may use the term 'act' in contradistinction to content for the act-character alone.[85] Acts, in this specialized meaning, lack intensity, but show differences of quality and material. These moments, though inseparable, are independently variable.[86] Quality is that which marks an act as an act of ideation or judgment or question or doubt or wish.[87] Material is the specific direction of an act upon its object. Thus I may apprehend a given geometrical figure now as an equilateral and now as an equiangular triangle. Here the objects are the same; the contents are the same; the act-qualities are the same; but the act-materials are different. That is to say, the material of an act determines not only what object is apprehended, but also as what (with what attributes, forms, relations) the apprehended object is taken.[88]

Within this analytical framework Husserl seeks specifically to test the validity of Brentano's law,—the law to which we have found Münsterberg raising formal objection: namely, that all psychical phenomena either are ideations or rest upon ideations as their basis.[89] Husserl is able to show that Brentano's formula involves an equivocation. Translated provisionally into his own terms the law would run: every intentional experience either is an ideation (*i. e.*, a bare or simple ideation) or has an ideation as its basis; but here the 'ideation' of the first clause means an act-quality, and the 'ideation' of the second clause an act-material.[90] Husserl accordingly enters upon an elaborate analysis of the term 'ideation,' which he equates, in its very widest sense, with the term 'act of objectification.'[91] The new genus may be differentiated, qualitatively, into thetical and athetical acts of objectification: the former being the acts of 'belief' in the sense of J. S. Mill or of 'judgment' in the sense of Brentano, and the latter being the corresponding acts of 'simple ideation;' and, materially, into propositional and nominal acts ("Columbus discovered Amer-

[85]Husserl himself speaks of the intentional content (*Log. Unt.*, ii., 375, 378, 386 ff.) and of the intentional essence of the act (392 ff.). It is, however, hardly possible, in any extended discussion, to avoid the narrower use of the term: cf. Messer, *Empfindung und Denken*, 45, 47, 74.

[86]*Log. Unt.*, ii., 374, 386 ff., 391. Cf. 566.

[87]*Ibid.*, 386, f.

[88]*Ibid.*, 389 f.; for a broader definition, cf. 462. In the *Ideen* the terminology has again changed: see esp. 267 f. Here and in *Bericht*, 244 the distinction of quality and material is ascribed to Brentano: I suppose the reference is to the distinction of quality (affirmation, negation) and *Sinn* in Brentano's doctrine of the judgment (*PES*, 283, 303).

[89]See above, note 15.

[90]*Log. Unt.*, ii., 428 f.

[91]*Ibid.*, 447: cf. 449, 458 ff.

ica," "Columbus, the discoverer of America").[92] Brentano's law may now be rewritten in the form: every intentional experience either is an act of objectification or has such an act as its basis: so phrased, the formula is valid.[93] The important thing for Husserl is, no doubt, that he has thus thought himself clear. The important things for us are that, by keeping his discussion at the phenomenological level, he has avoided all reference to the attitude of an 'I', whether empirical or pure,[94] and that with 'act of objectification' he has introduced a term which seems destined to play a large part in empirical psychology.[95]

§11. Husserl's influence may, indeed, be traced all through the later and more characteristic work of the Würzburg school. How deeply it had affected the psychology of Külpe himself, we shall probably never know. We have, however, a *Psychologie* from the hand of Messer, a member of the school, whose thinking has been largely shaped by Erdmann, Husserl and Külpe.[96] This book, in default of the promised recasting of Külpe's *Grundriss*, must now engage our attention.

Messer offers three characterizations of the conscious or psychical. He accepts from Münsterberg the formula that physical is shareable, psychical unshareable experience; he accepts from Lipps the view that the psychical always is, while the physical is not, in some sense 'mine;' and he accepts from Husserl the distinction of the psychical as immanent from the

[92] *Ibid.*, 449 f. In the *Ideen* (235) the terms 'thetical' and 'athetical' are replaced by the broader terms 'positional' and 'neutral', with consequences that do not immediately concern us.

[93] *Log. Unt.*, ii., 458. The second clause may also be paraphrased: "or necessarily includes as constituent an act of objectification whose total material is at the same time—and in the sense of individual identity—*its* total material."

[94] In the *Log. Unt.* (340 ff.) the 'pure I' is phenomenologically discredited. In the *Ideen* (109 f.) it comes back, but the consequences again do not immediately concern us. Only, the cutting of Münsterberg's difficulty, in the *Log. Unt.*, would appear to have been premature.

[95] As in Dürr's edition of Ebbinghaus' *Psychologie*, 1911-13.

[96] Messer published in 1908 a little book entitled *Empfindung und Denken*, which bears Husserl's impress on nearly every page. Its main effect upon the reader's mind is a sheer wonder that two things so incompatible as sensation and thinking can lie down together between the same covers. The *Psychologie* of 1914 has the more empirical flavor of the Würzburg school.

Külpe's posthumous work, *Vorlesungen über Psychologie* (ed. K. Bühler, 1920) is utterly inadequate on the side of its author's system. It does not either show Külpe at his best; much of the writing is the work of a jaded and driven man. In any case, Külpe may have been less nearly ready than we supposed. Bühler's preface ends with the (to me surprising) statement: "Ueber den Willen und das Denken hat Külpe nicht gelesen und leider auch keinerlei Aufzeichnungen hintergelassen."

physical as transcendent.[97] We may pass over Münsterberg and Lipps,[98] and come at once to Messer's interpretation of Husserl. Since the transcendence which characterizes the physical is a transcendence of consciousness, it follows of necessity that some psychical must, for Messer, take the form of 'consciousness of.' As a matter of fact, Messer declares roundly that all consciousness is consciousness-of, *Gegenstandsbewusstsein*, though certain elements of consciousness, taken in isolation from their regular setting, lack intentionality.[99]

The experiences (*Erlebnisse*), which make up the subject-matter of psychology may be divided into those of knowing, feeling and willing.[100] We may also speak of consciousness of objects (in a narrower sense), consciousness of state, and consciousness of cause.[101] The elements of these experiences are classified as palpable or impalpable, according as they stand up

[97]A. Messer, *Psychologie*, 27 f., 32 f.; cf. 55, 73, 127 f., 138, 146. Messer is here speaking of *das bewusst Psychische*. Whether there are also *unbewusst psychische Vorgänge* is a question that he leaves open, though he inclines to answer it affirmatively: 35 ff., 251 ff., 365 f.

[98]For Münsterberg's position, see *Grundzüge*, i., 1900, 72. The Lippsian 'mine' does not mean for Messer the constant and overt presence in consciousness of 'my I itself;' the I-character or relation of 'mine' is often represented solely by the unitariness and blendedness of experiences: *Psychol.*, 27.

[99]*Ibid.*, 66, 53. The sweeping statement, as always, brings its difficulties. Messer admits, *e. g.*, that conscious complexes (fusions of pleasant feeling with sexual sensations, fusions of unpleasant feeling with sensations of pain) may occur without reference to an object (307). Such complexes are obviously far removed from the status of conscious elements; and pain, at any rate, may be so overwhelmingly itself as to drive away all competitors of the referential kind.

There is difficulty, moreover, in connection with Messer's whole doctrine of emotion (*Affekt*). In *Psychol.*, 52 feelings and emotions (apparently, all feelings and all emotions) are intentional. But the simple feelings of pleasantness and unpleasantness are positively not intentional (302), and emotions are only strong and sudden feelings (293). I find, indeed, no reference to affective intentionality in the pages that deal in detail with emotion and its classification. A feeling may, however, carry intentional reference in its own right,—in which case it is no longer a bare pleasantness or unpleasantness, but a *Wertgefühl* or affective evaluation (303). Hence in a later list we find no mention of "feelings, emotions," but only of "experiences of evaluation and will," as intrinsically intentional (374; cf. 52). In general it seems that Messer recognizes three levels of emotive process: (1) a fusion of feeling with sensations, wholly without objective reference; (2) a fusion of feeling with acts of the consciousness of objects (in the narrower sense), *i. e.*, a complex in which the feeling is not intentional but the basal ideation carries objective reference; and (3) a fusion of affective evaluation with ideation, a complex in which both principal factors carry reference (cf. 66). How these types are to be fitted to his definition of consciousness is not easy to see.

[100]*Ibid.*, 65.

[101]*Ibid.*, 66. This classification is borrowed from J. Rehmke, *Lehrbuch der allgemeinen Psychologie*, 1894, 148 f.

under observation or as they refuse to be observed and must accordingly be recovered through reflection.[102] Of the palpable elements, sensations belong to all three types of consciousness.[103] Knowing, or the consciousness of objects, includes further, as palpable elements, the images which correspond with sensations, temporal and spatial contents, and the impressions (of 'same,' 'like,' 'different,' etc.) which lie at the basis of general concepts.[104] Whether consciousness of state and consciousness of cause embrace palpable elements of a specific (non-sensational) sort is difficult to say: Messer's statements are conflicting. It seems that the simple feelings are, as a class, impalpable, though in exceptional cases they will bear scrutiny.[105] Conation, too, while it is intentional and should therefore by rights be impalpable, may, on occasion—if it is aroused involuntarily, and especially if it is directed upon objects of sense-perception—be observed during its course.[106]

The term 'act' is used by Messer in two senses: first, for the whole of an intentional experience, and secondly for the act-side or act-character of such an experience.[107] In the first sense, acts are called palpable or impalpable according as their intended object is or is not represented by sensations and images.[108] In the second sense, in which the acts are conscious elements

[102] *Ibid.*, 48, 74, 202; *Empfindung und Denken*, 78 f. I suggest 'palpable' and 'impalpable' as the English equivalents of *anschaulich* and *unanschaulich:* cf. 'Macbeth,' II, i., 40.

[103] *Psychol.*, 66, 74 f.

[104] Messer recognizes peripherally excited and centrally excited (or reproduced) sensations in primary and secondary (synaesthetic) form: *Psychol.*, 127 ff. For space and time as contents, see *ibid.*, 149, 155, 175 f., 202. It is expressly said that space is not an attribute of sensation, like quality and intensity (149); and time is so far from being an attribute of anything that it may, in Messer's opinion, be experienced for itself, as empty time (176). Yet we are told later that feelings share with sensations the attributes of intensity, quality, and the "extensives Merkmal" of temporal duration, while they lack the "räumliches Charakter" that attaches to all sensations (280)! For the palpable impressions underlying concepts, see *ibid.*, 180 ff.

[105] *Ibid.*, 48: feelings that are closely connected with sensations and that possess a 'peripheral' character are palpable. But sensations are defined differentially as palpable (74); and feelings are impalpable (278 f., 346). Husserl (*Log. Unt.*, ii., 369 ff.) and Stumpf recognize a class of affective sensations, and thus meet the difficulty. In *Empf. und Denken*, 23, Messer takes the same view: *cf.* Psychol., 276.

[106] *Ibid.*, 48. But all *Streben* is involuntary (312)! Moreover, the later distinction seems to be, not that of peripherally and centrally directed conations, but rather that of less definitely directed conation and more definitely directed desire (312). All conation 'aims at' something (311, 314). Husserl is ready to admit sensations of desire or sensations of impulse (*Begehrungsempfindungen, Triebempfindungen*) as non-intentional elements of will (*Log. Unt.*, ii., 373 f.; *Ideen*, 172).

[107] *Psychol.*, 53, 202.

[108] *Ibid.*, 139, 191, 296, 346.

abstracted from the whole of an intentional experience, they are always (with the exception of peripherally directed conation) impalpable.[109] Messer does not attempt to draw up a list; we must therefore make it up for ourselves as best we can.

Under the head of consciousness of object, we have, first, the acts of ideation in the wider sense: acts of perception, of memory and of imagination.[110] Then follow the acts of conception or thinking or knowing (*Wissen*).[111] Here we find, to begin with, the experience of concept or meaning.[112] Messer further names the acts of relating, of comparing, of judging, and of knowing in the pregnant sense (*Erkenntnis*).[113] Judgment is a synthetic act of relating, comprising at least two members, which is accompanied by the strictly elementary act of affirmation or negation.[114] Since every synthetic act may be translated into a simple act, the propositional act of judgment has a nominal act as its parallel.[115] Since, moreover, judgments may be passed with all degrees of subjective assurance, we have attendant acts ranging from conviction to conjecture.[116] Finally, over against judgment stand supposal, which bears the same relation to judgment as imagination to perception and memory, and the bare entertainment of a thought, shorn of all reference whether to validity or to invalidity.[117]

Later in the book we come upon the acts of intellectual evaluation and intellectual preference. The former, as judgments of value, may be subsumed to the general category of judgment. It is not clear that the acts of preference may be subsumed, in like manner, to the general category of comparison.[118]

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[109] *Ibid.*, 202 f. These acts are not characterized attributively, as they are by Husserl and by Messer himself in *Empf. u. Denken* (50 ff.). We get a hint of quality and material, however, in such passages as *Psychol.*, 138 f., 204, 208.

[110] *Ibid.*, 139, 191 f. Messer does not seem to be quite as certain as Husserl (*Log. Unt.*, ii., 364; *Ideen*, 224 ff.) of the specific act-character of imagination. He says, indeed,—though in the context of explanatory psychology,—that the distinction of memory and imagination springs rather from practical and epistemological than from psychological needs (*Psychol.*, 346).—It is to be noted that the total acts (intentional experiences) of memory and imagination may be either palpable or impalpable: 221, 346.

Whether the *Bildbewusstsein* of *Psychol.*, 138 is elementary, we are not told. According to *Empf. u. Denken*, 60 f., it is not.

[111] *Psychol.*, 139, 202.

[112] *Ibid.*, 207.

[113] *E. g.*, *ibid.*, 214, 212, 209, 216.

[114] *Ibid.*, 207, 211, 212 f.

[115] *Ibid.*, 208.

[116] *Ibid.*, 219.

[117] *Ibid.*, 220.

[118] *Ibid.*, 303 f., 305. In the latter passage, *Vergleichung* and *Vorziehen* are distinguished.

Under the head of consciousness of state, we have as impalpable elements, first, the non-intentional simple feelings (or the great majority of them), and secondly the objectively directed feelings (affective evaluations, feelings of value) and the corresponding acts of affective preference.[119] Lastly, the consciousness of cause includes conations, or at least those definitely directed conations which merit the name of appetition or desire, and acts of will. Messer insists that conations and acts of will belong to distinct classes of elementary experiences.[120]

There remains the phenomenon of attention. Descriptively regarded, attention is not an act; it is rather that attitude (*Verhalten*) of the I in which our consciousness of objects (the phrase is used, at first, in the narrower sense) is formed or constituted: "objects exist for us only in so far as we are attentive to them."[121] Attention thus stands in intimate relation to the consciousness of objects; indeed, we need not scruple to use this phrase in its wider sense, seeing that the objects of affective evaluation, of affective preference and of will are also objects of attention.[122] While, however, the mere fact that an object is given us guarantees the presence of attention, the increase of the clearness and distinctness of the object with increasing concentration of attention is sufficiently regular to serve as a descriptive character.[123]

§12. The systems which, in their phenomenological or descriptive aspects, we have now briefly reviewed may fairly be considered as typical of the whole psychology of act. Our purpose is critically to survey this psychology, and in particular to decide whether it has been more successful than functional psychology in its attempt to establish a special class of 'psychical' phenomena as the given subject-matter of psychological investigation. There are, however, among the authors to whom we have referred, two—Witasek and Messer—who, as exper-

[119] *Ibid.*, 276, 303, 305. For emotions, see note 99 above.

[120] *Ibid.*, 311.

[121] *Ibid.*, 254.

[122] *Ibid.*, 256.

[123] *Ibid.*, 256, 267; cf. 50 f. Messer seems to have forgotten that the object is ordinarily transcendent, so that its clearness and distinctness cannot serve as a psychological character of attention (137 f.). It is true that his instance, of sensitivity and sensible discrimination, implies theoretically an immanent object; but he has told us (140 f.), in regard to this very matter, that in point of fact the observer usually adopts the 'natural,' 'objective' attitude. Surely, then, it is clearness and distinctness of the 'content' or 'sense' of the act (the material, in Husserl's wider sense) that must characterize the attentive experience. See, however, *Empf. u. Denken*, 120, note 3.

imentalists, make appeal to our own interest, and who, as writers of text-books, seem directly to challenge comparison. Witasek, as we have said, belongs to the school of Meinong, and Messer to the schools of Husserl and Külpe. Let us see, then, as a preliminary to our main task, in how far these psychologists agree in their teaching.

The question that naturally stands first, the question of the classification of psychical phenomena, we shall discuss later. Passing this by, we take up in their order the principal points of the two systems.

(1) Both Witasek and Messer recognize the distinction of act and content. But Witasek regards these moments as inseparable; there is no act without content, and no content without act; whereas Messer affirms that acts (the act-characters of intentional experiences) may stand alone, as fully constitutive of consciousness, and that sensory contents may appear in the background of consciousness unaccompanied by acts.[124]

(2) Witasek accepts Brentano's law without reservation; there is no judgment, feeling or desire that is not based upon ideation. Messer, on the contrary, regards all consciousness as consciousness-of: a pleasant or unpleasant feeling may, by its intrinsic nature, be objectively directed; and an object "may just as originally be desired or willed as ideated and thought." Yet it cannot be said that Messer rejects the law: his statements are always qualified.[125]

(3) Witasek defines sensations as "perceptive ideations of the simplest possible contents." There is, therefore, an act of sensation in addition to the sensory content. For Messer there is no act of sensation; the sensory

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[124]Witasek, *Grundlinien d. Psychol.* (cited henceforth in this § as *W*), 1908, 75; Messer, *Psychol.* (cited henceforth in this § as *M*), 203, 255. In *Empf. u. Denken*, 1908, Messer grants that sensations may appear, without acts, in the background of consciousness (40), but leaves the separate occurrence of contentless acts an open question (100 ff.). Husserl, in *Log. Unt.*, ii., seems to accept the actless content (372, 427), but denies that the act-character, the complex of quality and material, can stand absolutely alone (560 ff.; cf. 68 ff.). In *Ideen* (172) he leaves both questions unanswered. Lipps (*Leitfaden d. Psychol.*, 1909, 15) asserts that all contents or images are, implicitly or explicitly, representative, images of objects; whether there is a strictly "imageless thinking" he will not decide. Stumpf believes that sensations may be present and may undergo change without our 'remarking' the fact: but then these sensations are phenomena, not subject-matter of psychology. He inclines toward the acceptance of imageless thinking: but, again, every function must on his view have some sort of correlated content (*Erscheinungen*, 1907, 11, 25, 34).—The experimental data regarding imageless thought do not here concern us.

[125]*W*, 97, 315; *M*, 66, 303, 314. In the first passage from *M*, feeling and will "somehow include or presuppose consciousness of objects [in which sense?];" it is as if Messer had not yet contemplated the chapter on value. In 303 there is an 'intimate connection' of knowing and feeling: but is the knowing basal? In 314 the reference of conation and willing to objects may be termed "practical ideation," ideation being taken "in the most general meaning of the word." Yet the objective reference has just been declared intrinsic!—In *Empf. u. Denken*, 53 ff., Messer accepts Brentano's law in Husserl's formulation.

content is "perfused and quickened by the thought-intention" of perception.[126]

(4) Witasek, after some hesitation, admits the primary data of visual and tactual space-consciousness to the rank of sensations. His position in regard to time is not clear, though he leans toward the acceptance of a true sensation of time-present. Messer, on the other hand, has palpable content-elements of space and time (time-present, time-past, time-future), but no specific acts correlated with these contents.[127]

(5) Messer's palpable impressions of 'same,' 'like,' 'different,' etc. are 'given with' sensory contents and 'founded upon' them. They are, psychologically, of the same order as sensations, and have no specific acts. Witasek agrees with respect to concomitance and dependence; but he transforms the 'impressions' into complete ideations of a special kind, namely, 'produced' ideations, or ideations which the subject, under the influence of sensations and by their assistance, produces (so to say) out of himself.[128]

(6) Witasek places, alongside of sensations and produced ideations' the third class of reproduced ideations. He thus brackets together the ideas of memory and of imagination, which Messer keeps apart. It is not clear whether Messer has an act of bare reproduction. He recognizes acts of

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[126]*W*, 102, 218, 298 f.; *M*, 75 f., 139; *Empf. u. Denken*, 19 f., 45. So Husserl, *Log. Unt.*, ii., 245, 371, 714; *Ideen*, 172. For Stumpf, sensation as a mode of primitive perceiving, is all act (*Ersch.*, 16; cf. Brentano, *PES*, 103, 190, etc.). Lipps spoke in 1903 (*Leitfaden*, 2) of act and content of sensation; the act is the 'my having' of later editions, and the term does not further appear. Indeed, in 1905 Lipps rebukes those who talk of the 'act' of sensation; what they mean, he says, is act of thought! He criticises Husserl on the ground, apparently, that Husserl's athetical act of simple ideation is an act of sensation: but of course it is not. He further criticises those who make sensation a mode of consciousness of objects, and here he undoubtedly has Meinong in mind. See T. Lipps, "Inhalt und Gegenstand: Psychologie and Logik," *Sitzungsber. d. kgl. bayer. Akad. d. Wiss.*, 1905, 516 ff., 521; A. Meinong, "Ueber Gegenstände höherer Ordnung," etc., *Zeits. f. Psych.*, xxi., 1899, 187 ff., 198 f.; "Bemerkungen über den Farbenkörper und das Mischungsgesetz," *ibid.*, xxxiii., 1903, 3 ff.; "Ueber Gegenstandstheorie," *Untersuchungen zur Gegenstandstheorie und Psychologie*, 1904, 14; R. Ameseder, "Beiträge zur Grundlegung der Gegenstandstheorie," *ibid.*, 93 ff.—It may be added that Lipps' real process of sensation has its object: *Leitfaden*, 1909, 79 f.

[127]*W*, 171 ff., 201 ff., 215 ff.; *M*, 148 f., 176.; *Empf. u. Denken*, 24 ff. Stumpf (*Ersch.*, 4, 23) regards these things as phenomenal. For Lipps, the *Anschauungsformen* of time and space are the qualitatively new products of extensive fusion (of real processes or of conscious contents): *Leitfaden*, 1909, 98 f., 103 ff.

[128]*W*, 225, 232; *M*, 180; *Empf. u. Denken*, 25 f. Stumpf (*Ersch.*, 4, 7, 16, 22 f., 33) has a class of relations distinct both from phenomena and from functions. Lipps ascribes the relations to apperception: they are "modes in which objects are referred to one another in the apperceiving I," though they are "unequivocally determined by the objects" themselves: *Leitfaden*, 1909, 161, 164.

imagination and of memory: the latter (as we shall see) belongs to another part of Witasek's system.[129]

(7) Both Messer and Witasek recognize the specificity of judgment. We note, however, several points of difference. (*a*) For Messer, the act of judgment is always at least bimembral; the act is, in Meinong's phrase, synthetical. For Witasek, judgment may be either synthetical or merely thetical. (*b*) Witasek finds in the act of judgment two invariable moments, affirmation-negation and belief or conviction, and an occasional moment, evidence (of certainty, of probability). Messer identifies the invariable moments: affirmation-negation, acknowledgment-rejection, taking-as-true (as-untrue) and conviction are, for him, one and the same. Evidence he regards as a condition of affirmation-negation, and judgments experienced evidentially for the first time he marks off as acts of knowledge (*Erkenntnis*). (*c*) Witasek and Messer agree that a judgment may be passed with different degrees of subjective assurance. For Witasek, however, the difference resides in an intensive variation of the act-moment of conviction; for Messer, who does not recognize intensive gradation of act, it consists in the replacement of a taking-as-true by a taking-as-probable or a taking-as-possible. Judgments of possibility, in Witasek's system, are judgments of subsistence, as distinguished from judgments of existence. (*d*) Messer subsumes inference to judgment: it is judgment whose relational members are themselves judgment-contents. Witasek looks upon inference as common both to judgment and to supposal.[130]

(8) Messer's perception, as intentional experience, is practically identical with Witasek's produced ideation. Perception proper (as distinct from perceptive ideation) is for Witasek a special case of judgment. Messer, as we have seen, makes all judgment at least bimembral.[131]

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[129] *W*, 246 ff.; *M*, 192 f. Here the ideas of imagination and recollection are the two principal species of *Vorstellungen*, and recollection is distinguished from the mere 'renewal' of a perception. Yet *M*, 221 hints at an act-difference between perception as such and ideation as such (cf. K. Koffka, *Zur Analyse d. Vorstellungen u. ihrer Gesetze*, 1912, 270 ff.). In general, *M* speaks only of imagination and recollection.—Stumpf (*Ersch.*, 16) includes *Empfinden* and *Vorstellen* under *Wahrnehmen:* it seems that only the phenomena differ. Lipps has a bare *Vorstellen* as receptive experience or *Widerfahrnis*; he has also acts of imagination; and he has acts of (introspective) recollection both at the level of perception and at that of judgment (*Leitfaden*, 1909, 16 ff., 20 f. 336). For Husserl's analysis see *Log. Unt.*, ii., 463 ff., 471 f.

[130] *W*, 279 ff., 295 f., 310; *M*, 206 ff.; *Empf. u. Denken*, 138 ff. The doctrine of judgment (like that of form-quality, which I avoided in a previous note) is too detailed for discussion at this point. For Lipps' view, that judgment is my acknowledgment of an object's claim, see G. Anschütz, "Theodor Lipps' neuere Urteilslehre: eine Darstellung," *Arch. f. d. ges. Psychol.*, xxx., 1914, 240 ff., 329 ff. I further note only that Stumpf (*Ersch.*, 26; cf. Brentano, *PES*, 260 ff.) finds in judgment "a new functional attitude;" that Messer's distinction of one-rayed and many-rayed acts (*M*, 207) derives from Husserl (*Ideen*, 247 f.); and that Meinong discusses thetical and synthetical judgments in *Ueber Annahmen*, 1902, esp. 145.

[131] *W*, 239, 288 ff.; *M*, 162. Stumpf, following Brentano (*Tonpsychol.*, i., 1883, 96; cf. *PES*, 277), at first raised perception to the rank of judgment; he now (*Ersch.*, 16) makes perceiving prejudgmental. Lipps uses *Wahrnehmung* in two senses: for a *Widerfahrnis*, and for the consciousness of reality of the presented object. In either case perception is prejudgmental (*Leitfaden*, 1909, 15 f; Anschütz, *op. cit.*, 334).

(9) Recollection and recognition are also, for Witasek, forms of judgment. Messer does not distinguish between them; and his act of recollection or act of recognition is not a judgment, but a mode of ideation.[132]

(10) Both Messer and Witasek, again, recognize the specificity of supposal. According to Witasek, however, supposal stands to judgment as reproduced ideation (ideas of memory and imagination) stands to perceptive (produced) ideation; according to Messer, it stands to judgment as imagination stands to perception and memory (recollection). Moreover, Witasek's supposal includes what Messer distinguishes as supposal and as the bare entertainment of thoughts. And Witasek's supposal further covers hypothesis, which is for Messer a "more or less probable judgment."[133]

(11) Attention receives markedly different treatment in the two systems. Messer, we remember, places attention outside of his three phenomenological classes. It is neither knowing nor feeling nor willing; it is an attitude of the subject wherein and whereby objects are constituted. Witasek finds the nuclear fact of attention in a thetical act of judgment, an act of apprehension. Attention is thus on all fours with perception, recollection and recognition.[134]

(12) In the psychology of feeling, we expect differences. It is noteworthy, nevertheless, that for Witasek feeling is all act, while for Messer it is (save in the case of feelings of value) all content. It is curious, too, that the distinction between sense-feeling and aesthetic feeling is drawn on

[132] *W*, 290 ff., 292 ff.; *M*, 192 f., 239, 247. Lipps has a feeling of familiarity, over and above the acts ('perceptive' and judgmental) of recollection: *Leitfaden*, 1909, 336.

[133] *W*, 309, 311; *M*, 220. Lipps agrees with Messer as regards hypothesis, but considers supposals in general to be subjectively conditioned judgments (*Leitfaden*, 1909, 241 ff.). Stumpf also hesitates to accept the specificity of supposals (*Ersch.*, 30). Husserl looks upon supposal as a by-mode of positional consciousness (*eine..seitabstehende Modifikation der Glaubenssetzung*), and declares that Meinong's *Annahme* is an equivocal term (*Ideen*, 224, 228). For Meinong himself, supposal is a fundamental psychical fact, to be included along with judgment under the general heading of thought (*Ueber Annahmen*, 1902, 266, 276 ff.). If one is bent upon making it a form of judgment, then it will be a judgment of imagination (*Ueber die Erfahrungsgrundlagen unseres Wissens*, 1906, 60; cf. *Ueber Annahmen*, 285).

[134] *W*, 297; *M*, 254. In *Empf. u. Denken* (120) attention is not constitutive of our consciousness of objects, but is simply "an especially high degree of the consciousness of objects." Husserl, in the *Log. Unt.*, ii., has in fact left things obscure. He is clear that attention covers the whole range "des anschauenden und denkenden Meinens" (162 ff.); and he is clear that "acts must be there" if we are to live ourselves into them, *i. e.*, to attend to their objects (385). But he does not decide whether this attending is itself an act (386). In the *Ideen* attention is, definitely, not an act (65). It is rather a ray, issuing from the pure I and terminating on the object; it is therefore immanent in all acts which are attitudes or acts of the I itself; it shows itself phenomenologically in noetic and correlated noematic modifications which have a peculiarly subjective character (192). Messer in *M* professes to follow Lipps: but he is taking Lipps very loosely (*Leitfaden*, 1909, 79, 142). Objects are constituted, for Lipps, by the terminal act of the conscious activity of apprehension. Stumpf, who (as we saw above: note 20) at first made attention a feeling, now ascribes to the function of remarking a specific attribute (*Merkmal*) of distinctness which he characterizes figuratively as a greater or less "accumulation of consciousness" (*Ersch.*, 11, 17).

diametrically opposite lines. According to Witasek, the aesthetic feelings are directed wholly upon ideational content: change of act (as from sensation to reproduction) leaves them unaffected. Sense-feelings, on the other hand, are essentially bound up with ideational act: pain felt and pain remembered are radically different things. According to Messer, the sense-feelings are feelings which attach directly to sensory contents, and the aesthetic feelings are feelings based upon "acts of the consciousness of objects." The difference which we expected could hardly be more extreme.[135]

(13) Messer devotes a chapter of his book to the consciousness of value. The primitive form of this consciousness is the affective, which at its simplest is an act of feeling, *i. e.*, an objectively directed pleasantness or unpleasantness. In Witasek's system its position is very different. Just as there are feelings based upon acts and other feelings based upon contents of sensation, so it is with judgment: the logical feelings or feelings of knowledge are based upon acts of judgment, the feelings of value or ethical feelings upon judgment contents. The difficulty which we feel in Messer's account—how a simple feeling, any more than a simple sensation, can of itself assume or acquire intentionality—is thus avoided. Moreover, Witasek is able to proceed from judgment to supposal. There is no feeling based on the act of supposal; but there are feelings—play-feelings, in contradistinction to real or serious feelings—based upon its contents. Of these Messer says nothing.[136]

(14) In the psychology of volition, too, we expect differences; and again, we are not disappointed. The act of will which for Messer is elementary, and which is to be distinguished from the equally elementary conation or desire, is for Witasek the highest development of that same elementary desire. According to Messer, an object may be desired or willed as directly as it may be ideated or thought; according to Witasek no object, but only an objective, may be desired or willed; desire rests always upon some supposal. And so the differences continue. It may be remarked, as a curiosity of system-making, that in Witasek's chapter the simple reaction figures, in Külpe's sense, as the primary means "of an exact experimental investigation of volition, indeed, of conation at large," while Messer, a member of Külpe's school, disposes of it in his chapter on attention.[137]

These fourteen points may suffice to show the likenesses and differences of the two systems. There is resemblance. We saw that there was a likeness between Wundt and Brentano as long ago as 1874,[138] and it would be strange if there were none between two experimental systems of forty years later. The resemblance, too, is more than general; it is a family likeness; the systems are of the same type. Yet the differences are many, so many that every chapter invites us to a choice between alternatives.

To trace the sources of such difference is not an easy matter. It is plain on the surface that Messer's system is syncretistic

[135] *W*, 324 f.; *M*, 295 f.

[136] *W*, 328, 330 f.; *M*, 303. For Lipps and Stumpf, feelings of value always imply judgments (*Leitfaden*, 1909, 341 f.; *Ersch.*, 27, 30). Husserl sets the problem in his own terms in *Ideen*, 239 ff.

[137] *W*, 349, 351; *M*, 311, 314: for reaction, *W*, 363, *M*, 265, 273. Lipps derives will from conation (*Leitfaden* 1909, 258, 301 ff.). Stumpf (*Ersch.*, 26 f., 30) seems to include will under the emotive functions.

[138] Cf. this JOURNAL, xxxii., 1921, 110 f.

and that Witasek's is logically compact; several influences have been at work on the one, and a single predominant influence has moulded the other. If, however, we consider the systems as wholes, we may perhaps formulate a chief ground of difference as follows. Messer is bent upon bridging the gulf between the palpable and the impalpable factors of consciousness, or (in Humean terms) upon linking up 'ideas' to 'impressions.' Hence, in spite of his aversion from 'sensationalism,' he devotes a great deal of space to the palpable, and even coquets with the notion of a 'functional indefiniteness' of palpable contents.[139] Witasek, on the contrary, carries the distinction of act and content back to the very lowest terms of conscious experience. But Witasek, in his turn, has all Brentano's affection for the judgment,—to which he adds Meinong's affection for the supposal: and so we find these things looming large throughout the second part of his system, where Messer deals upon a more independent basis with feeling and will.[140] Here is a real cause of systematic divergence. There are others, still upon our phenomenological level; and there are others, again, at the levels which we have not touched. While then a detached view brings out the family resemblance of which we have spoken, the nearer and more limited view of a disciple can hardly fail to lead to partisanship. To the student of Messer, Witasek will appear heretical; and the student of Witasek must sharply question the orthodoxy of Messer.

§13. From this digression we turn to our main task: the appreciation of the psychology of act taken as a whole. It would of course be easy, if our aim were simply polemical, to dismiss the matter with the simple statement that, 'as a whole,' there is no psychology of act. And it is true that, in the concrete, we have had to do with psychologies rather than psychology, with differentiation rather than consolidation. From the common

[139] *M*, 180: the idea recurs in *Arch. f. d. ges. Psych.*, xxxii., 1914, 54. The notion of functional indefiniteness (*M*, 195) is, on Messer's own showing, altogether out of place in the context of content: cf. the distinction of descriptive and functional concepts in "Ueber den Begriff des 'Aktes'," *Arch. f. d. ges. Psych.*, xxiv., 1912, 250, etc. For the notion itself, see G. E. Müller, *Zur Analyse d. Gedächnistätigkeit u. d. Vorstellungsverlaufes*, iii., 1913, 545 ff.

[140] Witasek's enthusiasm leads him to remark that "the transcending which is peculiar to our mind, the direction upon objects, is in strictness a function only of judgment or supposal" (*W*, 310). At least an incautious statement! For if direction-upon is the ear-mark of the psychical, and if the direction of an ideation is due to the 'cooperation' of a judgment or a supposal, it follows that the ideation as such is not psychical: in which case Brentano's law implies the commingling of psychical and non-psychical at the very centre of the psychical realm.

starting-point of intentionalism our authors have taken widely divergent paths. The question remains, however, how deep the sources of divergence lie,—whether they are only superficial and accidental, or whether they are fundamental. Until this question is faced and answered, we cannot either affirm or deny that psychology may be wrought out in terms of a peculiar class of intentional facts.

We shall put the act-systems, first, to a triple test, by considering their attitude in regard to classification, and to the special topics of sensation and attention.

(1) We begin with the classification of psychical phenomena. Here, again, it would be easy to show that the systems differ. Indeed, they differ so radically that one, two, three or four ultimates may be recognized.[141] We must remember, however, that classification is, primarily, a matter of convenience, and that the functional and experimental schools have also been unable to supply a classification that should be generally accepted. All that the differences prove, therefore, is that intentionalism is no unerring or unequivocal guide to arrangement. That is worth noting: but we shall get more light if we consider the classifications adopted by an individual psychologist at different stages of his systematic thinking. We have, fortunately, two examples of the kind required, in the works of Stout and Lipps.

The classification put forward in the first edition of Stout's *Manual* (1899) is very simple. It may be represented as follows:

I. Ultimate modes of being conscious of an object
   - *a.* The cognitive attitude or cognition or knowing
   - *b.* The feeling attitude or feeling [always dependent upon cognition]
   - *c.* The conative attitude or striving [coordinate with cognition]

II. Experience not at the moment contributing to the cognitive function of consciousness
   - *d.* Sentience or sub-consciousness

There can be no doubt that Stout is here trying to cover the whole field of consciousness by way of objective reference. Sentience, the outlying category, is after all nothing more than cognition at rest: modifications of consciousness that may and

[141]The single ultimate, of which we have so far had no example, is characteristic of the conational system of S. Alexander: "there is but one ultimate mental process [a continuous tissue of acts, or awarenesses, or enjoyments], namely conation" ("Foundations and Sketch-plan of a Conational Psychology," *Brit. Journ. Psych.*, iv., 1911, 243; cf. H. A. Reyburn, "Mental Process," *Mind*, N. S. xxviii., 1919, 19 ff.). Something of the same sort appears in the psychology of P. Natorp. Consciousness has three moments, which may be distinguished by abstraction: the I, the content, and the relation between them. Since the I is presupposed by psychology, and since the relation to the I is an irreducible and indescribable ultimate which, like the I, is a precondition of psychology, it follows that psychology has to do only with content (*Allgemeine Psychologie*, i., 1912, 24, 33.).

will present objects happen, at some given time, not to be discharging this presentational function, and must accordingly be distinguished from their active kindred. They are, nevertheless, as the term sub-consciousness attests, only at a lower level of the development which culminates in presentation.[142]

The classification of the third edition (1913) is less simple. It may perhaps be represented as follows:[143]

Modes of consciousness

I. Immediate experiences which are primarily objective (are themselves primarily objects), or presentations
   - *a.* Sensations
   - *b.* Images
   - *c.* Imageless or amorphous presentations

II. Immediate experiences which are primarily subjective, or ultimate modes of the relation of the conscious subject to its objects
   - *a.* Simple apprehension [precondition of *b* and *c*]
     1. Implicit apprehension or sub-consciousness
     2. Marginal awareness
     3. Explicit apprehension
   - *b.* The cognitive attitude
   - *c.* The attitude of interest
     1. Passive: the feeling attitude
     2. Active: the conative attitude

Both tables have two main divisions; but we note at once that the divisions do not tally; in the second table Stout has given up the attempt to classify by way of objective reference alone. The presentations of 1899 were, in the language of 1913, 'subjective' experiences, modes of cognition; and if sentience is not presentation, it is at any rate something that was presentation a moment ago and will be presentation a moment hence. Now, however, this sentience has been marked off from its alternative sub-consciousness, and has expanded into a new category of objective presentation, altogether distinct from cognition; while sub-consciousness, remaining 'subjective,' finds its place within a new—and fundamental—differentiation of objective reference. The whole perspective of the system has changed.[144]

Lipps' original classification (1903) is also very simple. There are four ultimate classes of the "conscious contents or conscious experiences" which form the subject-matter of psychology:

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[142]G. F. Stout, *A Manual of Psychology*, 1899, 56 ff., 68 ff. That all was not well with the concept of 'sentience' I pointed out in *Thought-processes*, 1909, 224 ff.

[143]I say 'perhaps' only because I am taking the three forms of simple apprehension from the chapter on Attention, and attention is conation (*ibid.*, 1913, 125).

[144]*Ibid.*, 1913, 3 f., 5 ff., 11, 102 ff., 129, 140, 176, 532.

I. "The directly experienced I with its determinations, the feelings" (absolutely subjective contents);

II. "The contents of sensation and sense-perception, *i. e.*, the simple sensory contents, the complexes of sensory contents, and the spatial and temporal forms and modes of their arrangement" (absolutely objective contents);

III. "The directly experienced relations of the I to what is objective, and the relations of the I in general" (intermediate contents); and

IV. "The ideational contents corresponding with all these conscious contents" (secondarily objective contents).

This table is exhaustive; it names all the genera of contents of consciousness; "there are no other conscious experiences."[145] And when the reader has assured himself that the "phenomenal acts" belong to the class of relations, or contents intermediate between the I and its objects, the complete outline of Lipps' system lies before him.

In 1909, however, Lipps has given up the idea of an inventory of consciousness. Psychology now has to do with "consciousness and conscious experiences;" and as this subject-matter unfolds, in the introductory sections of the book,[146] we find an intercrossing complexity that cannot by any trick of strait-jacketing be reduced to a single table. The following summary shows some of the complications with which the beginning student must contend.

I. Lipps speaks of experiences, contents, acts, activities, states and colorings of consciousness.

Contents are not experiences; they are rather the images or impressions experienced in consciousness.

Acts, too, are not intrinsically experiences. In our acts of thought and conation we do not ordinarily experience the objects apprehended and desired. We experience objects "only in so far as we have adequate images of them."

Activities and states (which latter are identical with colorings) are experiences.

II. Experiences are either objective or subjective. The type of objective experience is sensation, the having of a simple sensory content. The term covers also experiences of bare sense-perception, the mere having of a complex of sensory contents in spatial and temporal arrangement; and the bare ideation in which we have, as imaginal content, the image of some object in the outside world. All other experiences are subjective. Their type is the feeling.

The acts of thought, again, although (as we have seen) they are not intrinsically experiences, are either subjective or objective, according to the nature of their object.

III. It is to be noted that 'experience' by no means implies completeness or independence of the conscious datum so named. In sensation, for example, I have as objective experience the having of a sensory content, and as subjective experience the experience of myself as sensing. Every objective

[145] Lipps, *Leitfaden*, 1903, 16 ff., esp. 20.

[146] *Ibid.*, 1909, 1-43.

experience thus includes or incorporates a subjective experience. In the same way my acts, though not in themselves experiences, are subjective experiences in the sense that in and with them I experience myself as thinking, desiring, etc.

IV. Lipps distinguishes receptive experiences, acts and states. The receptive experiences are those that we 'run up against:' sensations, the experience of claim. At the opposite pole from them stand the acts of conation, in which we aim at some object. The affective states differ from both.

V. Sensations are differentiated as sight, hearing, etc.

States are all included within the opposition pleasantness-unpleasantness, or move in that dimension. Since, however, many states are named, it appears that a further differentiation must be made.

Acts are specified in some detail. Thus we have acts of production (evocation of images of imagination), acts of mixed reception and producduction (thought), acts of aiming (conation), acts of 'bracing up to' and 'putting the final touch on' (starting and stopping points of conative activity), acts of acknowledgment (judgment). The relations are not quite clear. Perhaps there are two genera of acts: the one including as species the acts of imagination, thought and judgment, the other those of conation and conative activity.

VI. Conation and activity may be either active or passive.

Conation and activity may, further, be either inner or outer, according to the nature of the object on which they are directed. Inner activity is activity of apprehension, activity of imagination, activity of apperception (which latter is, again, variously specified). Outer activity is bodily activity.

It appears that we have in the experiences of conation (subjectified experience of claim) and of conative activity (feelings of actual and potential activity) a foundation or undercurrent of subjective experience distinguishable from the specific feelings which colour it: but the point is not clear.

VII. Along with acts and activities are given subjective experiences of their relation: experiences of conditioning, of issuance, of dependence, which Lipps groups together as experiences of motivation.

VIII. Every conscious experience and everything experienced in consciousness may later recur in the form of a reproductive image or image of ideation.

IX. Consciousness is intentional, but it is intentional in varying manner and degree. Sensations contain an object only potentially or implicitly. Acts of thought explicate these objects, in such wise that consciousness may thereafter busy itself with them; there is in thought "a peculiar interaction between the I and the objects." Conation and conative activity are, on the other hand, always 'aimed at' something; they 'are' the interrelation or the cooperation between the object with its claim and the individual consciousness. And since all feelings are colourings of this conative activity, I cannot feel without feeling myself somehow related to an object; I am cheerful or depressed, confident or in despair, 'about' something. Finally the experiences of motivation appear to be intentional in the same way as experiences of conation in general.

There is little here to suggest the tabular statement of 1903. No doubt, all the four classes of the earlier edition may be traced in the later; but our efforts at precise arrangement are baffled, and we wonder whether, after all, the simplicity of Lipps' first exposition was not itself rather apparent than real. At any rate, no clue to the psychological labyrinth is now to be found among

the conscious experiences. If we wish to set things in order we must go below and behind consciousness to the unconscious real.—

Summaries are tedious to make and tedious to read. We have undertaken them, in these two instances, for the light that they and the comparisons resulting from them may throw upon the act-systems in general. And we note, first, that they raise, pretty definitely, the doubt whether intentionalism is adequate to the whole subject-matter of psychology. That, to be sure, is a large question, which we could not, in any event, seek to answer at this point: we note only that it is raised, and raised at the very outset, by the act-systems themselves. Stout appears to have transgressed the boundaries which he originally accepted, and Lipps saves the principle only by adding an implicit to his explicit intentionality. In another way, however, the summaries afford us positive light,—light upon the attitude and interest of the authors of these systems. It is clear that the interest lies in argument and discussion and explication and distinction, in the logic of system, rather than in the facts of observation.

It is, indeed, nothing less than illuminating to read Stout's editions with an eye to facts. The third edition has sought to bring its references down to date, so that Sherrington replaces Foster and Myers replaces Ebbinghaus. But the writer's factual equipment has increased hardly at all. 'Views' are what Stout is concerned with, the critical discussion of other men's views and the exposition of his own. The whole vast field of experiment, with its perplexing entanglements of dependence on conditions and theoretical bias and degree of training of observers and all the rest,—this whole bulk of raw material for the science of psychology is passed indifferently by, for what Locke and Hume and Lotze, and Ward and James and Ladd and Marshall and Stout himself 'think' about psychology. Even where, as in the instance of experiments upon the lower animals, Stout refers to monographic sources, even here his attitude is not primarily that of the man of science, careful of method and wary of generalization; he is interested rather in the inferences that have been drawn from observation, in the systematic setting of the facts, in their interpretation and explanation. And as to Lipps! the student of Lipps will hardly realize that there may be, within the compass of psychology, facts of the same existential order that he has met in his study of physics and biology. He reads of unutterables, indescribables, indefinables, uniques, which he is required to 'experience;' and he reads through a serried array of imperatively dogmatic statements regarding these ultimates, which he is required to accept.

Should he wish to go further, he is referred to other works by Lipps himself.[147]

We may grant that Lipps' opinions, and Stout's too, are heartily worth knowing; we may grant also—nay more, we shall insist—that logical construction has its necessary place, is (so to say) the full half of a scientific system. Only we cannot forget that the half here is less than the whole. Moreover, we see from our summaries that the statements originally made, whether dogmatic or argumentative, are sadly instable. Ward once remarked that systematic psychology "is not liable to change every half-dozen years."[148] What is it then, in this psychology of act, that does change? Something changes: simple apprehension is superadded upon cognition, the pure I is ruled out and invited in, perception drops from the judgmental to the prejudgmental level, contents are and are not experiences, sensation has and has not an act of its own, and so forth. Here, surely, are systematic changes! Nor would they be open to criticism if they reflected and kept pace with the growing store of facts, and if the facts were set out at large as ground and warrant of the changes. In the absence of grounding facts, and in view of the general trend and tenor of their work, we must conclude that the psychologising of Stout and Lipps is, essentially, a matter of applied logic. They begin with certain empirical concepts,—the objective reference of consciousness, the conscious I; they proceed to explicate these concepts as thoroughly and minutely as they can; and the longer and more earnestly they meditate, the greater is the wealth of discoverable meaning, the greater the number of its discriminable aspects. This, then, is the positive light that our summaries throw upon the act-systems.[149]

(2) The mention of act and content of sensation brings us to a second point. There can be no possible question that sensation —however it is to be defined; and we need not, for a long time to come, enquire too curiously about its definition—has been, from the beginning, a source of real difficulty to the act-systems. The story is roughly told in the following table:

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[147]The third edition of the *Leitfaden* refers the reader to three books written by other authors: for sensation and fusion to Wundt's *Physiol. Psych.*, for tonal fusion to Stumpf's *Tonpsych.*, and for memory to M. Offner's *Das Gedächtnis*, a work which appeared while the new edition of the *Leitfaden* was in preparation.

[148]*Mind*, N. S. iii., 1894, 143.

[149]It may be added, in the sense of our previous discussions, that the scientific psychologist, whose addiction to fact may leave him neglectful of his logic, has a good deal to learn from this explication of concepts. I have sometimes been staggered to read what my own 'sensationalism' logically 'implied,' when I neither admitted the sensationalism nor acknowledged the implications. All the same, such logical criticism is salutary.

Sensation	Act	Content
Brentano, Höfler, Alexander	Psychical	Physical
Witasek, Geyser	Psychical	Psychical
Stumpf	Psychical	Phenomenological
Lipps, Husserl, Messer	None	Psychical

The table, as a mere outline, obscures many differences. Brentano identifies content with object; Höfler has an analogue to sensation proper in the ideation of a simple psychical, a psychological element; Alexander regards all psychical acts as acts of conation; and so on. The table takes account, too, only of certain systems in which the term 'act' is systematically employed. It omits Münsterberg's 'noetic relation,' and Stout's 'presentative function,' and so on. It shows, nevertheless, how real the difficulty is. The one thing certain is that, somewhere in the world, we come upon sensory contents; and then we must decide for ourselves whether they are physical or psychical or neither physical nor psychical. And we have not even so much of assurance as regards the sensory act.[150]

The doubt raised by our summaries, whether intentionalism is adequate to the subject-matter of psychology, seems therefore to be well founded. For if one starts out with intentionalism one can hardly find anything simpler than the perception of external objects. But then one is reminded, whether historically or empirically, that there is something logically prior[151] to perception, namely, sensation; and yet sensation is not obviously intentional. What, then, is to be done? Well, one may speak of intentional consciousness as 'consciousness in the pregnant sense,'—whatever that may mean; one may draw a distinction between matter and form of consciousness,—as if form were in some way a guarantee of intention; one may oppose 'potential' to 'actual' intention,—whatever, again, that may mean. Or one may throw the sensory content overboard, and keep the sensory act as a mode of perception or ideation or conation. Or one may hold fast to the letter of intentionalism, and make the sensation, act and content together, an humbler understudy of perception. It is a matter of taste which course one adopts, and it is a matter of skill how well the resulting system holds together. Whence of course it follows that no degree of subjective assurance and no refinement of critical acumen

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[150]A. Höfler, *Psychologie*, 1907, 210; S. Alexander, "On Sensations and Images," *Proc. of the Aristot. Soc.*, 1910, N. S. x., 1910, 1 ff.; J. Geyser, *Lehrbuch d. allg. Psych.*, 1912, 49, 224, 306; H. Münsterberg, *Grundzüge d. Psych.*, i., 1900, 309; Stout, *Manual*, 1913, 210.

[151]Or, perhaps, chronologically prior; sensation, in certain systems, still has a genetic flavour. Cf. H. Hofmann,"Untersuchungen über den Empfindungsbegriff," *Arch. f. d. ges. Psych.*, xxvi., 1913, 1 ff.

on one's own part can prevent a like assurance and a countering criticism on the part of others. But a house divided against itself shall not stand.

(3) After all, though, it may be said, we have not proved that the 'house' is divided. Sensations lie on the outskirts of psychology, form the ragged edge of the psychological system; we meet them at the outset, but we have very little to do with them thereafter. Besides, the difficulty, such as it is, may readily be cut; it has been cut cleanly enough by Stumpf, who dismisses all the doubtful elements, all sensory and imaginal contents, to a limbo of their own. Why should we lay so much emphasis upon a merely preliminary difficulty?

The objection forgets that we are talking of system, and that a system must be systematic throughout. It forgets that the diversity of opinion among the psychologists of act is due precisely to their effort toward a consistent systematization. Their chief interest is here, on the side of applied logic; and a breakdown at the beginning is, logically, as serious as a break-down later on. We need not rest, however, with this reply. We will go to the heart of the systems, to the doctrine of attention; and we shall find that attention, no less than sensation, is a stumbling-block to the intentionalist school.

We hasten to make an exception of Lipps; but then Lipps' whole system is exceptional. It embodies, so to say, two psychologies, real and phenomenal, unconscious and conscious. Every real psychical process has, according to Lipps, an intrinsic energy, in virtue of which it attracts or appropriates psychical force. Attention, now, is a term which belongs in strictness, not to consciousness, but to the domain of the real mind: it is nothing else than the psychical force which, accruing to a real process, lifts it (under favorable conditions) above the limen of consciousness. We then 'have' a conscious content. If the process appropriates still more force, or if attention turns to it in greater degree, it becomes a process of thought, and we have in consciousness the activity of apprehension which culminates in the simple act of thought. Here is the intellectual limen. If the process is capable of yet further appropriation, it becomes an apperceptive process, and we experience in consciousness the activity of apperception, which results, according to circumstances, in various acts of higher intellectual orders. Attention, throughout, is the psychical force which 'turns to' or 'is appropriated by' the real process of ideation, of thought, of apperception.

No one will deny that this doctrine of attention is logically constructed. Our objection, if we object at all, can only be that it rests upon a basis of pure invention. That is for Lipps neither an objection nor a difficulty; he insists that invention is neces-

sary, and that his own "substructure of thought" is adequate to the psychological occasion. If, as he admits, we know nothing of process and stage of process, of psychical energy and psychical force, that truly is our misfortune; but we may then be all the more grateful to thought for supplying the deficiencies of knowledge.[152]

Such is the exceptional system, for which attention has no terrors. The rest are less happy. Stumpf, as we know, identifies his primitive function of perceiving with a 'taking note of;' attention thus seems to be present to consciousness from the first. This perceiving has a graded attribute of distinctness (*Deutlichkeit*), which Stumpf nevertheless trusts so little that he is forced to speak figuratively of an 'accumulation of consciousness.' Messer, getting no help from Husserl, turns to Lipps; attention is an attitude of the I, logically prior to our consciousness of objects,—and all consciousness is consciousness of objects. Witasek, in flat contradiction to the school of Husserl, makes attention an act, one of the ubiquitous acts of judgment. "To many contemporary psychologists," he adds, "this opinion will appear nothing less than monstrous; all the same it is true; and anyone who has a discerning eye for the psychological specificity of the act of judgment will recognize it without difficulty in the constitution of attention." Geyser, who paraphrases attention in Lippsian terms as our "intellectual occupation" with an object, must transcend consciousness in both directions in order to bring his subject under control. Attention as psycho-physiological energy is responsible for the clearness of certain conscious contents; and attention as the intellectual occupation of the mind with the contents of consciousness (this 'mind' is a matter of supplementary inference, not of observation) is responsible for our reflective fixation of them. So there are two attentions, and neither is psychological. Pfänder, like the Messer of *Empfindung und Denken*, makes attention the higher degree of our consciousness of objects, the denser or more concentrated portion of the cone of light which issues from the I of consciousness and plays upon its immediate objects. Finally, Stout retains in all three editions the statements that "attention is simply identical with conation considered in its cognitive aspect" and that "conation and cognition are different aspects of one and the same process," statements which, in default of some equivocation, would seem to be irreconcilable.[153]

[152] *Leitfaden*, 1909, 78-83, 141-148.

[153] Witasek, *Grundlinien*, 297; Geyser, *Lehrbuch*, 256 ff., 261 ff., 724 f. See esp. 263: "This reflective fixation does not represent the consciousness-of, *i. e.*, is not a mode of awareness, but is a holding fast of the content of which we are conscious, to the end that the mind energise on this content its acts of relating, and thereby extend contentwise its awareness of the content."—Stout, *Manual*, 1899, 247, 581; 1907, 257, 599; 1913, 367, 704; A. Pfänder, *Einführung in d. Psychol.*, 1904, 272 ff., 354 ff.

It was plainly a bad day for empiricism when the experimental movement brought attention to the forefront of systematic psychology.[154] Intentionalism can deal with perception and imagination and memory and thought and emotion and desire, but hardly with attention. As in sensation it finds too little, so in attention it finds too much. For what is attention, empirically taken, if it is not already and of its own nature intentional? It too is a surplusage, and so it suffers a fate akin to the fate of sensation. Either it is thrown out of consciousness, not (to be sure) into physics or phenomenology, but into a realm of logical priority; or else it is identified with some particular intentional process. And the extremes meet. Perception, which at its simplest is for Höfler and Witasek sensation, becomes for Stumpf, still in its simplest form, an implicit attention.

§14. It would seem then, that the differences among the act-systems are in fact fundamental and inevitable, not superficial and accidental. On the side of subject-matter, intentionalism cannot cope with sensation and attention, while it cannot either dispense with them. Witasek, it is true, takes heroic measures; sensation is perception, and attention is judgment: the system is saved. But who, outside of Meinong's school, will accept a salvation offered on such Procrustean terms? Besides, the interest in systemization, in applied logic for the sake of the logic, characterizes all the psychologists of act. Psychology appeals, so to say, to their personal ingenuity in relating and distinguishing and constructing; and where the appeal is thus individual, there—as in philosophy or poetry—the outcome will of necessity reflect the personality of the writer. We saw that there are many differences between Witasek and Messer. We may now safely say that these differences go deep. They are the differences, not of two scientific psychologists, but of two personalities expressing themselves in the terms of systematic psychology. If intentionalism is scientific, then science can no longer be called impersonal.

How indeed shall we account, otherwise than by personality, by training induced upon given temperament, for the varying definitions of the 'act' itself? An act for Lipps is a doing, the deed of the I of consciousness. The picture that rises from his pages is that of a strenuous and resourceful, highly self-conscious 'individual,' acting and reacting in a world of other individuals and of material things. An act for Husserl is something very different, something that by contrast almost suggests passivity: an experience of a certain essential constitution, of intrinsically

[154]Cf. my *Feeling and Attention*, 1908, 171 ff.

intentional make-up. Husserl accordingly reminds us of nothing so much as the skilled lexicographer, teasing from the word before him every discriminable shade of meaning, and nicely distinguishing it from the words that everyday use has made us think synonymous. Stumpf's act, lastly, lies between these other two. It is active, in the sense that it is found or given as active; it is by no means the deed of an I. It is an active verb, moving amidst phenomena and relations, and generating its 'correlate,'—a sort of caddis-worm that houses itself variously in the sticks and shells and stones of its independently variable surroundings. We need not go further. We have an act which is my doing and is experienced as my doing; we have an act found as active ultimate among inactive ultimates; we have an act which is an embodied intention, the subject-matter of a morphology of knowledge. What, then, for psychology, is 'the act?' We are brought back, after all, to our polemical starting-point: there is no psychology of act, there are only psychologies. But we may now add, as at the beginning we could not, that on the basis of intentionalism there will be only psychologies.

Here, however, we remark a notable difference between the psychology of act and the psychology of function. There is no reason to suppose that functional psychology enjoys any long lease of life. It was born of the enthusiasm of the post-Darwinian days, when evolution seemed to answer all the riddles of the universe; it has been nourished on analogies drawn from a loose and popular biology; it will pass as other fashions pass. Even now, indeed, it may be passing. The movement that has labelled itself 'behaviorism'—a 'psychology' not only without a psyche and a psychical, but also without a psychological—appears to get its motivation, at any rate on the negative side, from dissatisfaction with the psychology of function.[155] But be that as it may, there is no seed of life in functionalism compared with the power of perennial self-renewal that inheres in intentionalism. Functional psychology (if we may again change the figure) is a parasite, and the parasite of an organism doomed to extinction, whereas intentionalism is as durable as common sense. We noted long ago that the empirical psychologist (we may now

[155]Behaviorism has not yet become clear either as to its own working concepts or as to its relations to psychology: see A. Robinson, "Behavior as a Psychological Concept," *Proc. Arist. Soc.*, N. S., xviii., 1918, 271 ff. A reaction against functionalism is suggested by the biological flavor of behavioristic writings, and is expressly admitted by J. B. Watson (*Behavior, an Introduction to Comparative Psychology*, 1914, 8 f.). Logically, indeed, a strict behaviorism can have no quarrel with an existential psychology, since there is no point of contact between the two disciplines. The only possible relation is that of correlation, and the extreme behaviorist declines to correlate. Cf. my critique of Watson, "On 'Psychology as the Behaviorist Views It,'" *Proc. Amer. Philos. Soc.*, liii., 1914, no. 213.

say, the psychologist of intention) means to take mind as he finds it, and that like all the rest of the world, who are not psychologists, he finds it in use; he finds it actively at work in man's intercourse with nature and with his fellow-man, and in his discourse with himself.[156] That is how 'mind' naturally presents itself to common sense, to the man of affairs, to the intelligent man of science who lacks psychological training. A great mathematician and physicist, speaking in 1869 of the "phenomena of mind," declared that "science can be expected to do but little to help us here, since the instrument of research is itself the object of investigation," since (that is to say) the mind which we study is the mind by which we study, or the intentional experiences which we seek to know are the intentional experiences whereby we know. And if it is objected that fifty years have allowed a good deal of water to flow under our scientific bridges, we may point out that Stokes' words are repeated by the physicist Tait in 1885 and by the biologist Thomson in 1911.[157] They would be accepted today, without objection or reflection, by the vast majority of scientific men outside of psychology itself. Small wonder, then, that within psychology too this same common-sense attitude, an attitude natural to us as our mother-tongue, should never fail of representatives! We shall always have psychologists of Brentano's stripe: what we have tried to make clear is that these men will give us psychologies, but not (as Brentano hoped) psychology.

These conclusions may content us. In showing that intentionalism takes the obvious, natural, proximate, common-sense view of psychology and psychological problems, and that the adoption of this pre-scientific view as scientific puts a premium upon individual differences, upon personal ingenuity of explication and arrangement, we have probably done as much as by mere counter-argument we are able to do. It would be useless to write out, over against the psychologists of act, the list of those who deny that they find intentional experiences in the contents of consciousness, for the affirmative is always in better logical case than the negative. Moreover, the denial itself shifts the universe of discourse, or changes the point of view from which 'consciousness' is regarded. When Ach tells us that an observer reports, from the fore-period of a simple sensory reaction, one knowing (*Wissen*) and three to five awarenesses (*Bewusstheiten*), we may perhaps be surprised by the fullness of the report, and may even go so far as to suspect the influence of suggestive

[156] This JOURNAL, xxxii., 1921, 119.

[157] G. G. Stokes, Presidential Address, in *Report of the 39th Meeting of the Brit. Assn. for the Advancement of Science*, 1870, cv.; P. G. Tait, *Lectures on some Recent Advances in Physical Science*, 1885, 26; J. A. Thomson, *Introduction to Science*, 1911, 105.

questioning; but we do not meet the situation by declaring that "a knowing (*Wissen*) is never given in consciousness;" we have then simply substituted our own definition of psychology for that of Ach.[158] The one complete and positive reply to intentionalism is the existential system, the system that is partially and confusedly set forth (anything like completeness and purity of exposition is not possible to our present knowledge) in the works of Wundt and Külpe and Ebbinghaus.[159] If we can build psychology upon a definition that is scientific as the word 'science' is to be understood in the light of the whole history of human thought; and if we can follow methods and achieve results that are not unique and apart but, on the contrary, of the same order as the methods and results of physics and biology; then, by sheer shock of difference, the act-systems will appear as exercises in applied logic, stamped with the personality of their authors. They will not, on that account, languish and die, because 'mind in use' will always have its fascination, but they will no longer venture to offer themselves as science.[160]

§15. Negative criticism always needs more words than positive construction. The upshot of the preceding paragraphs may, however, be condensed into a brief statement. The claim has been made that 'conscious' phenomena constitute a special

[158]N. Ach, *Ueber die Willenstätigkeit und das Denken*, 1905, 40 f.; K. Marbe, *Experimentell-psychologische Untersuchungen über das Urteil, eine Einleitung in die Logik*, 1901, 92; cf. G. E. Müller, *Zur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufes*, iii., 1913, 542; A. Messer, *Experimentell-psychologische Untersuchungen über das Denken, Arch. f. d. ges. Psych.*, viii., 1906, 207 *n.* It is needless to say, after the criticism made of Ladd's psychology, that I agree with Marbe; I am here concerned with formal argument.

[159]I am thinking, of course, of the earlier Külpe ("Das Ich und die Aussenwelt," i., *Philos. Studien*, vii., 1892, 405; *Grundiss der Psychol.*, 1893, 27), and of Ebbinghaus before his work was edited by Dürr.

[160]In *Thought-processes*, 60 f., I sought to 'psychologise' Brentano's act as being, existentially, the temporal factor intrinsic to psychological subject-matter. Thereupon a friendly critic remarked: "On peut s'étonner que Titchener... ait cru devoir exposer et discuter des théories dont la valeur psychologique est douteuse. Il s'agit plutôt d'analyses verbales, d'idéologie, de subtilités, de distinctions scolastiques" (T. Ribot, *Rev. phil.*, lxix., 1910, 650). My attempt sprang, indeed, from a rather desperate desire somehow to bring intentionalism and existentialism together at close quarters, and to transcend the mere calling of names. If the two schools were in any real sense schools of psychology, then—I thought—they must after all be concerned at bottom with the same problems; and I knew that the epithets 'scholastic' and 'sensationalist' were often applied ignorantly and unintelligently. The same year, 1910, gave us, however, Wundt's essay on "Psychologismus und Logizismus" (*Kleine Schriften*, i., 511 ff.), which amply justifies Ribot's reproaches.

class of objects of experience, immediately and radically distinct from phenomena that are not-conscious, and that the science of psychology has to do with the objects of this given class. The resulting systems are either functional or intentional. We have found that in both cases they are empirical, that is, technological; they begin and end with 'mind in use.' They represent what we may call an art of mental living as distinguished from a science of mental life,—a general 'applied psychology' that is logically prior to the special 'applied psychologies' of education, vocation, law, medicine, industry. Functional psychology is through and through teleological, and by biological analogy lays down general norms, either directly or through the intermediation of philosophical theory, for the right conduct of our practical life. Intentional psychology is at once more individual and less naive than functional. We may perhaps say that its central task is logically to analyze, to explicate, the operations of perception and thought, as these terms are understood by the average educated person or are received from philosophical tradition; that it extends this procedure of logical analysis to emotion and will, understood in the same way; and that it seeks finally, with marked individual difference, to base the whole of psychology upon the intentional principle. It is thus, like common sense, an applied logic, though unlike common sense its interest lies more in the logic and less in the results of application. Hence it has a natural affiliation to philosophy, and especially to theory of knowledge or pure logic. Since, however, it is not itself pure logic, but rather a logical account of 'psychical phenomena,' it stands also in close relation to the particular technologies of mind, and especially to education.[161]

We see, then, that these 'psychologies of consciousness,' in order to maintain a logical continuity with philosophy above and everyday practice below, sever psychology from the other sciences, and redefine 'science' to suit their case. We can understand how philosophy, while wholly unconscious of bias, should look with favor upon such systems and with disfavor or indifference upon a truly scientific psychology. We can understand, too, how it comes about that current philosophy should have much to say concerning psychology, and but little to say of physics and chemistry. We can understand that psychiatrists and educators, eager to turn psychology to practical ends, should appeal to systems that are already technological and should look impatiently away from the bare impersonal facts

[161] I am here characterizing technology *a potiori*, by reference to the pure science upon which it preponderantly draws. In strictness such characterization is not permissible.

of an existential science.[162] All this we can understand, and understanding takes off the bitter edge of controversy. But we see, on the other hand, that physics and chemistry, and of late years biology also, are going their theoretical way without looking aside either to philosophy or to application. We see that they are achieving results of which philosophy must, in the long run, take account; and we see that these results are at once finding technical application. All this, therefore, is ground of encouragement to the votary of a strictly scientific psychology. And if our negative criticism is valid, then the feeling of encouragement becomes an imperative 'experience of claim.' Psychology fairly challenges us to attempt its systematic exposition on an existential basis.

[162]The appeal is intelligible in the light of history and of the historically conditioned education that these technologists receive. Yet it is worth remembering that there is no general technology of physics or chemistry or biology, to mediate between the sciences and their special technologies, the special branches of engineering and medicine. Remote and aloof from everyday life as the laboratories are, their results are taken up into practice at first hand. It is worth remembering too that, despite all the psychological systems from Aristotle down, it is only since the appearance of experimental psychology and its attainment of impersonal results that the special technologies of mind have sprung into vigorous being. Cf. G. E. Müller, *Zur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufes*, i., 1911, 147; H. Münsterberg, *Psychology and Social Sanity*, 1914, 291 ff.

AFFIRMATION AND NEGATION

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My purpose here is to report the results of four experiments dealing with the processes of affirmation and negation, and not to review or criticize the literature on the subject.[1] However, as a sort of a text or point of departure, I have chosen the following from Breese's *Psychology*, p. 323.

"In this conection we should note that the so-called negative judgments, or judgments of disbelief, are negative only in the form of language expression. The judging attitude itself is always a positive one. For instance, on seeing a counterfeit bill, I may exclaim, 'It is not good'. The judgment here consists in my acceptance of the represented content as 'not good'. This acceptance is psychologically a positive attitude, although the expressed form is negative. The judgment involved in the sentence 'The table is not round' is my positive acceptance of 'not-roundness' as an attribute of the table. Psychologically there are no negative judgments any more than there are negative perceptions, or images, or memories. It is only from the logical point of view that judgments may be called negative, and then only because of their external form."

The four experiments to be described in this report were devised to test this theory regarding negation, a theory which one finds expressed frequently in logical and psychological literature. Stated briefly, these experiments were:

I. Reaction-times: colors. Colored cards were shown in an exposure apparatus, the subject being instructed to move a lever in one direction if the color were red, for example, and in the opposite direction if the color were not red.

II. Cancellation of letter groups. Printed sheets containing 100 groups of four letters each were handed to the subjects. On some they were to cancel those groups containing specified letters, on other sheets those groups in which none of the specified letters appeared.

III. Reaction times: multiplication equations. Multiplication equations were typewritten on cards to fit the Ach exposure apparatus. The subject was instructed to move the reaction-lever in one direction when the answer was correct and in the opposite when it was incorrect.

IV. Cancellation of paired letters. 225 pairs of letters were mimeographed on each of the five sheets given to each subject. On some they were to cancel those pairs in which the two letters were the same, on others those pairs in which the two letters were different.

Experiment I.

A reaction-time set-up of apparatus was used in this experiment. It included an Ach card-exposure apparatus for 4 x 8 cm. cards, a Hipp or pendulum chronoscope, and a special reaction

[1] A brief bibliog raphy is given at the close of this article.

instrument so made that movement of a lever either to the right or to the left would either make or break the circuit, as desired. Several different sets of cards were used, each of which contained fifty cards of some one color, and ten each of five other colors.

The one color which appeared fifty times in the set was shown to the subject, who was instructed to react in one way whenever that color appeared and in the opposite way whenever any other color appeared. These other colors were not named. The subject was told that half of the cards were of the color shown him. These cards were shuffled together in the presence of the subject, but behind the exposure apparatus. With several of the subjects several different sets were used, on different days. In half of these experiments the positive[2] reactions were to the left and the negative to the right; in the other half this relation was reversed.

Results. The average reaction times for the positive and negative reactions and the differences between them are shown in Table I. Results are given for each day's work with each subject. While there was naturally some variability in the reaction time for each subject, the results are so uniformly in favor of the positive reactions that it was not thought necessary to compute any measure of variability.

These results furnish fairly conclusive evidence that the positive reactions take place more quickly than the negative. When red, for example, is the positive color, the processes including the appreciation of red and the appropriate reaction take place more quickly than those which include the appreciation of some other color as not red and the appropriate reaction.

TABLE I

AVERAGE REACTION TIMES, IN SIGMA

Subject	Positive	Negative	Difference (N–P)
Spr	328	400	72
Spi	317	424	107
..	284	386	102
..	266	325	59
..	245	370	125
..	276	363	87
Pee	369	469	100
..	364	458	94
..	360	451	91
Thi	321	403	82
..	355	374	19
Kuh	280	281	1
And	389	412	23
Gri	320	336	16

[2]Reactions to the one specified color will for convenience be referred to as "positive" reactions, and reactions to the other colors as "negative" reactions. The colors may also at times be called the "positive" and "negative" colors.

The introspections show great individual differences with regard to the method of fixing the instructions in mind and also with regard to the attitude toward the problem itself. For example, one subject made two reactions in succession when negative colors were shown, and this caused her to focus her attention for some time on the negative reaction. Her adjustment during the fore-period was so favorable to the negative reaction that results for the rest of the experiment showed shorter reaction time for the negative reactions.

At first there is a tendency to keep the positive color in mind, verbally or otherwise. The retention of the instructions as a whole may be wholly in verbal terms, in a combination of verbal imagery and kinaesthesis (arm and hand), or in a combination of visual imagery of the positive color and kinaesthesis. As the experiment proceeds there is a tendency for the instructions gradually to fade from consciousness, the reactions becoming more and more automatic. However, the adjustment of the nervous system probably remains much the same, so long as the subject does not notice just how many and just what the negative colors are.

There seems to be a positive relation between the tendency to visualize the positive color and the difference between the positive and negative reactions. Subject Spi has exceptionally clear and projected visual imagery. He reported that during the fore-period there was nearly always an image of the positive color projected to the slide covering the cards.

No concrete visual image of "not-red" was ever reported.

Psychologically, it seems to make little, if any, difference whether the consciousness that blue is not red, and therefore to be reacted to in a certain way, be verbalized as "this is not-red" or "this is-not red." Psychologically, either is a negation, at least so long as there are several not-red colors. The starting point in either the positive or the negative reaction is with "redness." "Red," particularly for the concrete-minded individual like Spi, is the "idea in mind." If the color shown is the same as this idea in mind, the judgment or perception—let us not quarrel over terminology for the present—may be regarded as positive, affirmative, or one of similarity. If the color exposed is not red, or not-red, the starting point is still with regard to red or redness, with a consciousness that the color when it appears is not in the class of reds.

Neurologically, this means that there is a definite adjustment beginning with the processes involved in the appreciation of red, and leading over to the appropriate reaction, so that when red appears the action takes place automatically, or almost so. But since each of the colors is specific, and since "not-redness" cannot be represented concretely, there can be no

complete sensori-motor adjustment for the negative colors. The adjustment on the motor side may be as complete, but not on the sensory side.

I suppose that no one would deny that there is some sort of retinal-cortical reaction of a certain more or less specific nature involved in the perception of red as red, and that the sensori-motor adjustment involved in reacting to red includes this retinal-cortical reaction or process. I believe it probable that the reactions to the negative colors under the conditions of this experiment must also involve this same process. If, during an experiment, something were suddenly to happen to this red-perceiving process, it is likely that it would prevent correct reactions to either red or not-red stimuli.

In opposition to the above interpretation or explanation of the results of this experiment it is possible that they are due, in part at least, to the fact that there were five times as many reactions to the one "positive" color, as to any one of the "negative" colors, and that during the course of the experiment there was a gradual development of specific reaction-habits to each color. If so, it is obvious that the mechanization of the sensori-motor processes starting with and including the appreciation of the positive color would take place more rapidly.

To modify this experiment in a way that would enable us to determine whether the results reported above are the result of, or affected by, the formation of any such specific reaction-habits, it would be necessary to meet two conditions. It would be necessary to have, first, as many of each of the "negative" colors as of the one "positive" color; and secondly, the total number of positive and negative reactions would have to be the same. It is obvious that this would be impossible. Other practical difficulties arise when one starts to work with a number of different colors all to be regarded as positive and an equal number to be regarded as negative. These two conditions, however, were met in the next experiment.

Experiment II.

My purpose in this experiment was to determine whether the correct explanation of the results of Experiment I was made, or whether those results were due to the establishment of reaction-habits to each of the colors used. To do this, it is necessary (1) that the number of positive and negative reactions be the same, and (2) that the number of elements to be regarded as positive be equal to the number of those to be regarded as negative.

Two carefully mimeographed forms were prepared, each having 5 columns of 20 groups of letters, each group containing 4 letters. Only 8 letters appeared on any one form, and different letters were used for the two forms. Each column in the first form contained 4 groups composed of the letters B R D X, in different orders, and 4 groups composed of the letters N J S T; 4 groups containing three of the first group of letters and one of the second; 4 groups containing two letters of each; 4 groups containing one of the first and three of the second. Taking the whole page into consideration, each letter appeared an equal

number of times. Each letter also appeared an equal number of times in each of the 4 positions in the groups. There were some slight deviations from the last two of the above rules, on account of the fact that there were only 8 letters and 100 groups. The groups in each column appeared in chance order. There was double spacing between the letters in the group, and between successive groups in the columns. To illustrate the nature and arrangement of this material, the groups in the first column were as follows:

D N X J	D S T R	B D R X	B S J N	T N J D
B D X T	D R X B	N R T S	T S J N	S J T N
S J D T	T N J S	R B X D	R X B D	D R J X
B J R X	J T S N	S D X B	S X R N	S R B J

No two groups were identical; at least the order was different.

The second form contained the letters H Z C K and L F M P. The general arrangement was the same as in the other form.

The experiment was divided into four parts, in each of which both forms were used. In Part A, the instructions for the use of the first form were: "When I say 'start', turn over the first sheet, and working by columns, cross out every group of letters which contains all four of these letters B R D X. (These letters were then written on the blackboard.) Work as rapidly and accurately as you can. After 45 seconds I shall rap on the table, and you will then turn immediately to the second sheet, and on this sheet cross out all those letters which contain none of the letters named." Then the next form was used, the instructions being the same with the exception that on the first sheet the subjects cancelled the groups which did not contain any of the letters H Z C K, and the second sheet those which contained all those letters.

With the second group of subjects this whole procedure was reversed.

Part B. The same forms were used, but the subjects were given only three letters to keep in mind, these being R B D for the first sheet and C H K for the second.

Part C. In this part only two letters were given, these being B X for the first, and K Z for the second form.

Part D. Here only one letter was given. This was the letter D for the first form, and the letter H for the second.

With the first group of subjects these different Parts were given in order just the reverse of that in which they are described above, Part D being given first and A last. With the second group this order was followed for the first half of each Part, and reversed for the second half. Yet, for any one of the Parts, the order, neglecting interpolations for the first group of

subjects, was I–P, I–N, II–N, II–P, I and II referring to the form used, and P and N to the nature of the instructions. With the second group the order was I–N, I–P, II–P, II–N.

For convenience, in what is to follow, the groups of letters containing all the letters given in the instructions will be called "positive" groups, and those which contain none of these letters will be called "negative" groups. The cancellations of these groups will also be referred to as "positive" and "negative."

In each of the four Parts, the number of possible positive and negative reactions was the same.

Not only was the number of positive and negative reactions the same, but, in Part A, as the vision was directed successively to one after another of the groups, the four letters given in the instructions and to be regarded as positive would appear the same number of times as the other four letters; and altogether, each letter would appear the same number of times as any other letter. The results of Part A are therefore more conclusive than those of the other three, so far as the interpretation of the results of Experiment I may be concerned.

With the first group of subjects each work period was of 30 sec. duration, while for the second group it was 45 sec. To make the results more directly comparable with each other and with the results of the other experiments the scores for each group were recorded in terms of the number of groups inspected, omissions, and errors per minute.

Results. The averages of the results for the two groups of 42 subjects are shown in Table II.

Little comment is needed. It is evident that the presence of a letter or of a group of letters, even with the order changed, is more quickly detected than the absence of these same letters from a group. These results seem to justify the explanation offered for the results of Experiment I; and, if so, that explanation would apply here as well as there. In fact, I cannot see how the results of this experiment can be explained in any other way.

TABLE II

CANCELLATION OF LETTER GROUPS: AVERAGE SCORES PER MINUTE

Part of exper.	Positive Instruction			Negative Instruction		
	Speed	Omissions	Errors	Speed	Omissions	Errors
A	88	1.06	.10	53	.45	.70
B	62	.41	.03	50	.36	.46
C	77	1.33	.22	62	.39	.45
D	104	2.65	.37	72	.21	.31
Average	83	1.36	.18	59	.35	.48

The subjects were asked to write out their introspections, but this proved to be a pretty hard task, as they had had little or no training in introspection, and nothing was said beforehand regarding the purpose of the experiment and they were not warned that introspections were to be called for. Since I was mainly concerned with the objective results, I did not care to run the risk that the setting of an introspective task might interfere with the work itself, which I wanted to be as free and natural as possible under the conditions of the experiment.

Almost without exception, the subjects reported that it seemed easier to detect the presence than the absence of a letter or group of letters. As to the reason for this, many said that the letters they were looking for seemed to stand out more clearly than the others, that they seemed to catch the attention more quickly. In Part D, where just one letter was given in the instructions, some of these subjects reported that the letter they "were looking for seemed to stand out, while the other letters in the group were not noticed." The explanation for this is of course to be found in the nervous basis of attention; that is, in an adjustment of the nervous system to facilitate the reception of the stimulus corresponding with the "idea in mind."

An interesting fact appears in the relative number of omissions and of wrong cancellations under the two working conditions. There are more omissions and fewer wrong reactions under positive instructions. Not only that, but under positive instructions there are more than seven times as many omissions as errors, while under negative instruction there are generally more errors than omissions.

Experiment III.

The apparatus used was the same as that of Experiment I. A multiplication equation, $9 \times 4 = 36$, for example, was typewritten on each of the cards, 4 x 8 cm., cut to fit the Ach card-exposure apparatus. On half these cards the answer given was wrong. Great care was taken to insure equal average difficulty of the equations with and without correct answers. In half the experiments the subjects moved the stick to the right when the answer was correct, and to the left when the answer was incorrect. In the other half the procedure was reversed. The subjects were told that half the answers were correct. The cards were shuffled together in the presence of the subject. There were 125 cards in the set, and none of the two left-hand members of the equations was larger than 9.

When the answer was wrong, it was always wrong by just one point, and for one-half it was larger, and for one-half smaller, than the correct answer.

In his introspective study of the process of negation, Wolters[3] used arithmetical equations in which there was a great difference between the given and the correct answers. He did not measure reaction times.

Results. The results are presented in Table III. They furnish rather conclusive evidence that it is easier to perceive the correctness than the incorrectness of the right-hand member of a multiplication equation. The situation confronting the subject and determining his attitude and adjustment in the fore-period is different from that in the preceding experiments, for in them each successive color or group of letters was judged with reference to a certain specified color, letter, or group of letters. In this experiment some of the subjects at first repeated (inner-speech) the substance of the instructions just before the card was exposed. This inner-speech repetition of the instructions tended to disappear as the experiment progressed.

During the mid-period (between the exposure of the card and the reaction) some subjects reported a tendency to read the equation with an inner-speech accompaniment. Many times the inner-speech recitation of the answer was not completed, although it might be begun. If the answer on the card was the number learned and associated to the two left-hand members of the equation, the whole process including the appropriate reaction seemed to take place smoothly and with little effort.

Some subjects report no inner-speech at all during the mid-period. One subject, Spi, reported some visual images of the correct answer to the equation in those cases where the answer on the card was wrong.

TABLE III

AVERAGE REACTION TIMES IN SIGMA

Subject	Positive (correct answers)	Negative (incorrect answers)	Difference (N-P)
Spi	1074	1341	267
...	1039	1439	400
Thi	1126	1270	44
Kuh	1010	1060	50
...	911	988	77
Gri	685	865	180
Students' results[4] Av. 21 subjects	913	1058	145

[3] Wolters, A. W., The Process of Negation, *Brit. Jour. of Psychol.*, 8, 1915, 183-211.

[4] These results were obtained by students working under my immediate direction and observation. Since I carefully refrained from any expression of opinion as to what the results might show, the results are probably fairly reliable. The differences ranged from 31 to 377 sigma in favor of the positive reactions.

When the answer on the card was wrong, there seemed to be a momentary confusion or disturbance. At least the whole process up to and including the initiation of the reaction seemed not to take place so smoothly and readily as when the answer is correct.

As with the preceding experiments, for our present purpose it makes little difference what we call the mental process involved in determining whether or not the answer on the card is correct. Looked at in slightly different ways, it might be regarded as one of affirmation and negation, as positive and negative judgment, or as the judgment or perception of similarity and difference (or of identity and difference), since it is largely a matter of comparing the given with the correct answer. Considered in this way it really makes little difference whether we say "36 is-not 35" or "36 is not-35." From either the psychological or neurological point of view either is a formal verbal statement of negation, or of a judgment or perception of dissimilarity or non-identity. However stated, the process is more complex than that which might be formally stated as "36 is 36."

If we assume that there is a set of cortical elements or paths, or some cortical process, which is functionally related to our consciousness of "36" (and its meaning), I believe it would be probable that the sudden elimination of this process would prevent a correct reaction whether the card showed "9 x 4 = 36" or "9 x 4 = 35." The mental processes preceding the reaction to the last card would be more complex, on this assumption, since they would include not only the "36" process but the "35" as well. This greater complexity would then explain the longer time required.

However, apart from any particular explanation which may or may not be valid, the bare results themselves furnish evidence that affirmation and negation are not the same; that they are not merely "two sides of the same process," as some one has said. From the standpoint of the action of the nervous system, it is not true that all negation is affirmation.

Experiment IV.

This experiment is one dealing more with similarity and difference than with affirmation and negation. But since these two problems are closely connected I decided to include this with the other experiments.

Some experimental work on this problem has been done. Most of it has been along the same general lines as that done by Hollingworth[5], who had his subjects arrange specimens of hand-

[5]Hollingworth, H. L., Judgments of Similarity and Difference, *Psychol. Rev.*, 20, 1913, 271.

writing in order of similarity and of dissimilarity in respect to a standard. Among other results, he found greater variation in the different arrangements in order of dissimilarity than in the other arrangements. It is not my purpose here to review or criticize the experimental work on this problem. Some of the results obtained by other investigators agree and some disagree with those obtained by Hollingworth. A list of references may be found at the close of this article.

Method. The subjects in this experiment were given carefully mimeographed sheets each of which had nine columns of twenty-five pairs of letters each. The letters used were: A, B, D, E, H, I, K, L, M, P. In half the pairs in which A appeared at all it was in first position, and in half in the second. There were ten pairs, both A's; ten pairs with A in first place and some other in the second place; and ten pairs with A in the second position and some other letter in the first. The same general rules apply to the appearance of each of the other letters.

The pairs appearing in the first column will illustrate the material used. These were:

I B	P D	B B	C C	M M
D D	P P	H I	K K	P P
E E	M I	I I	L A	C C
M L	E L	L K	K K	M H
P A	P L	A A	A D	K D

Each subject was given five of these sheets, stapled together. The instructions were: "Turn over the bunch of papers, and on the first sheet mark 'S' at the top of the first column, 'D' at the top of the second, 'S' at the top of the third, and so on, writing 'S' and 'D' alternately at the top of the nine columns. Now turn the sheets face downward again. When I say 'Start', turn the bunch over and, beginning at the top of the first column, cancel all the pairs of letters in which the two letters are the same. When I strike the table, stop working in that column and begin at once at the top of the second column, cancelling the pairs of different letters. Then at the next signal start at the top of the third column, cancelling those that are the same, and so on until the last column has been finished. Are there any questions? Ready. Start." After this page had been finished they were asked to turn the sheets face downward again. The instructions for the rest of the experiment were: "When I say 'Start' turn to the second sheet, and cancel all the pairs in which the two letters are the same. When I strike the table, turn to the second sheet and cancel the pairs of letters not the same; at the next signal turn to the third and do the same, that is, cancel those not the same; at the next signal turn to the next sheet and cancel the pairs that are the same. To help you re-

member which to cancel, when I give the signal each time I will say 'Same' or 'Different'. You will be allowed 60 sec. for each sheet. Ready. Start." Two sec. were allowed each time for turning over the sheets. Two groups of subjects, 42 altogether, were used, the procedure being the same with the exception that the order, exclusive of the introductory or practice sheet, with the first group was S–D–D–S while with the second it was D–S–S–D.

Results. The results of the introductory sheets were not scored for the reason that too many subjects finished each column within the 10 sec. interval allowed.

Table IV shows the scores for speed, omissions,and wrong cancellations or errors. The speed scores represent, not the number of cancellations, but the average number of pairs in-

TABLE IV

AVERAGES OF TWO ONE-MINUTE WORK-PERIODS

	Letters the same			Letters different		
Group	Speed	Omissions	Errors	Speed	Omissions	Errors
1	145	5.12	.17	117	.67	.49
2	138	5.10	.15	119	1.10	.45
Average	141.5	5.11	.16	118	.89	.47

spected per minute in the two periods in which the task was the same. These results show beyond a doubt that under the conditions of this experiment it is easier to determine or perceive the identity than the non-identity of the two letters in each pair, or at least that the former process takes place more quickly. There were no individual exceptions to this rule. With reference to the dispute whether judgments of similarity or of difference are more easily made, we can say at least that identity is more quickly perceived than the degree of difference existing between the letters used in this experiment.

It is rather difficult to offer a satisfactory explanation of these results. If, or whenever, there is a tendency to look at one of the letters of the pair a fraction of a second before the other, the explanation would be essentially the same as for the results of the other experiments. However, I am by no means sure that there is any such tendency. It may be that this is just one of the two or more factors all tending to produce the same result—if so, there would doubtless be individual differences in the relative importance of these different factors. Introspections might then be expected to differ.

Nearly all of the subjects stated that when they were canceling letters which were the same these pairs seemed to stand out more clearly than the others. Others went further and

stated that the main factor seemed to be a similarity or symmetry of outline, and that they hardly noticed what the letters were. When canceling pairs of letters that were different, some stated that they looked for these pairs, while others stated that they seemed to look for the pairs of identical letters, canceling those pairs which did not meet the requirements. Whatever else may be involved, we are probably safe in assuming that there is a greater or more wide-spread and complex cortical activity involved in the perception of "AK" than of "AA."

The results of this experiment also agree with those of Experiment II, in that there are more omissions but fewer wrong cancellations under positive instructions. These differences are in themselves conclusive evidence of a real psychological difference between the two working conditions, whatever they may be called. They also point to a similarity between the mental processes in these two experiments.

Summary

1. In the first experiment colored cards were shown, the subjects being instructed to move a lever in one way if the color were of a certain kind, in another way for any other color. The positive reaction times were, on the average, shorter than the negative.

2. It is easier to cancel groups of letters which contain certain letters than it is to cancel groups which do not contain these letters. 40 percent more work is done under positive than under negative instruction. There are fewer omissions but more wrong cancellations under negative instruction.

3. It does not require so long a time to determine the correctness of the answer in a multiplication equation as it does to determine the incorrectness of the answer. The average difference in time for the problems used was 145 sigma.

4. It is easier to pick out pairs of identical letters than pairs of different letters, where these two sorts of pairs are mixed together on a page. This difference is represented by the ratio 142:118.

5. These results indicate that the statement frequently made, that all negation is affirmation, is not true from the standpoint of the psychological and neurological processes involved.

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COMPARATIVE COGNITIVE REACTION-TIME WITH LIGHTS OF DIFFERENT SPECTRAL CHARACTER AND AT DIFFERENT INTENSITIES OF ILLUMINATION

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Introduction

Previous to the beginning of the present century all light used for purposes of general illumination was produced from incandescent solids, and hence possessed a continuous spectrum, of the same order as the solar spectrum, but differing in that it contained relatively less energy in the shorter wave-lengths, and more in the longer. The effect of monochromatic light, or of light possessing a line spectrum, on cognitive reaction-time was therefore a problem of pure science, and does not appear to have been investigated. (For the sake of brevity, the term "reaction-time" will be used henceforth, the words "visual cognitive" being understood.)

Early in this century Peter Cooper Hewitt discovered and developed a practical method of producing light from incandescent mercury vapor. Light so produced possesses the characteristic line-spectrum of mercury, in which a band in the greenish-yellow largely predominates, rendering it approximately monochromatic. As this light-source has come into general use for industrial purposes, the question of the effect of such light upon reaction-time becomes a matter of interest to applied, as well as to pure science. The present investigation was undertaken with a view to ascertaining what differences, if any, in such reaction-time would result from the use of light from mercury vapor, incandescent tungsten, and the sun under average conditions of daylight.

Spectral Character of the Different Kinds of Light Used

Mercury vapor light differs widely from the other two, its spectrum consisting essentially of four lines, *viz.*, a strong pair of greenish-yellow wave-lengths 579 $\mu\mu$ and 577 $\mu\mu$, an extremely brilliant green line of wave-length 546 $\mu\mu$, and a brilliant deep-

blue line of wave-length 436 $\mu\mu$. In addition to these there is a very faint crimson line, a faint blue-green line, and a pair of weak lines in the far violet. According to Bell's measurements,[1] about 90% of the visible energy of mercury vapor light is due to the three bands close together in the greenish-yellow and green, the balance being due to the blue line. This combination gives the light its peculiar "peacock blue" color.

Light from incandescent tungsten possesses a continuous spectrum somewhat richer in the red, orange and yellow, and weaker in the blue and violet, than sunlight. The curve, Fig. 1,

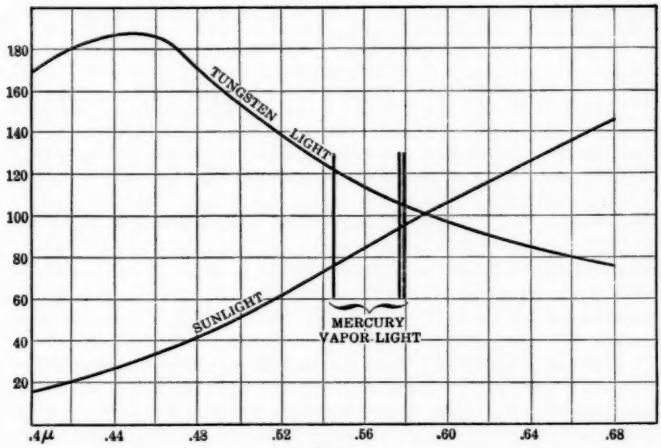


FIG. 1

shows the relative distribution of radiant energy in the spectra of blue sky, and the gas-filled tungsten lamp, equated to equal total visual intensity, *i. e.*, with 590$\mu\mu$ taken as 100 for each light, according to Luckiesh[2]. The vertical lines show the position of the three principal bands of the mercury spectrum.

Chromatic Aberration and Visual Acuity

In the early part of the nineteenth century Wollaston[3] showed that the refractive system of the eye is not achromatic, as had previously been assumed, but is slightly dispersive. Bell[4] states that "it is only in virtue of a very high maximum point in the luminosity curve of the eye that we are able to see distinctly at all. And it is this same fact which prevents the chromatic aberration being conspicuous under ordinary circumstances." This matter has recently been very carefully investigated by

Hartridge.[5] He finds that the relative dispersion of the refractive system of the eye is 45, which corresponds to that of a light flint glass.

The fact that the eye is subject to chromatic aberration naturally suggests the supposition that monochromatic light, by eliminating this optical defect, may increase visual acuity, or resolving power. This hypothesis has been investigated by Uhthoff[6], König[7], Orum[8], Broca and Laport[9], Ashe[10], Dow[11], Bell[12], Luckeish[13] and Rice[14]. There is a wide disparity in the conclusions reached by these investigators, which evidently arises from the difference in the method and apparatus used. Bell and Luckiesh used the same general methods, which consisted essentially in determining the relative intensities of illumination, measured on an equality of brightness scale, of light of different spectral character necessary to enable the eye to resolve certain test objects. Their conclusions are in very close accord, and show that the ratio of intensity of illumination by incandescent electric light to that of mercury vapor light, to produce equal acuity, or resolving power, is as 1.75 to 1, at ordinary intensities (1.5 to 2 foot-candles). Since it is well known that acuity is a function of illumination intensity, or surface brightness of the object, these results establish the fact that monochromatic light, or light of simple spectral character, gives greater acuity of vision than continuous spectra light.

Objects of the Present Investigation

Visual acuity being a function of the spectral character of the light, the further question suggests itself, whether reaction-time may not also vary with the nature of the light. The present investigation seeks to solve two related problems, *viz.*,

(1) What is the effect of light of different spectral character upon cognitive reaction-time?

(2) What is the effect upon cognitive reaction-time of different intensities of illumination?

As before suggested, these problems have a direct bearing upon manual labor performed under the direction of vision, since all such labor consists of muscular reactions in response to visual impressions in which cognition plays an important part. In devising the experiments, therefore, care was taken to insure actual cognition at each observation, and to eliminate the elements of visual resolution, practice, and fatigue.

Nature of the Experiments

The experiments consisted in exposing a test-object through an opening in the shutter, illuminated under given conditions, and requiring the observer to register his cognition of the object by pressing an electric key. The time required for the cognition and muscular reaction was recorded by a chronograph.

Apparatus

A special apparatus was constructed for carrying out the experiments. This consisted of a board 10x15 in., through the center of which was an opening $\frac{3}{8}$x$\frac{7}{8}$ in., the whole being covered with neutral gray paper, and supported at an angle of 45° upon a baseboard. A shutter of gray cardboard, in which there was an opening slightly smaller than the opening in the board, was attached by a pivot to the underside in such a manner that the opening would register with the opening in the board. This shutter was actuated by a spring, and its motion controlled by two stops operated by electromagnets connected in series with two electric keys located on diagonally opposite corners of the baseboard. Each of these keys was also in series with a pen on the chronograph.

The test-objects consisted of numbers containing 4 digits, printed in 10-point Roman type on white bond paper in black carbon ink. 120 different numbers were printed on a tape of paper, and means were provided for passing this tape immediately back of the shutter, so that when the two openings registered one of the numbers was exposed to view. A duplicate set of numbers was also typed upon one side of the tape, which did not appear to the observer, but which registered with an opening visible only to the operator, thus showing to the operator the number presented to the observer.

A Gaertner chronograph was used, so geared that 1 sec. of time represented a distance of slightly more than 1 in. on the record. Two pens were provided, one of which was in series with the shutter magnets, as described, and the other in series with a clock pendulum which made electric contact through a mercury globule at each oscillation. The rate of vibration of the pendulum was determined by taking a chronograph record of its oscillations for 10 min., timed by a stop-watch, and dividing the total time by the number of recorded oscillations. The electric current for operating the electromagnets was supplied by 4 dry cells.

Sources of Light

The light used to illuminate the test-object was from three different sources; *viz.*,

A Cooper Hewitt mercury vapor lamp, Type F, operated on alternating current, 60 cycles, at 4 amps, and 100 volts at the terminals, the line voltage being reduced somewhat by the resistance used to maintain constant current.

Two tungsten filament, gas filled, incandescent electric lamps, of 200 watts and 300 watts rated capacity respectively, at 105 volts. The lamp-bulbs were fitted with "cap diffusers," *i. e.*, hemispherical specular reflectors which covered the lower part of the bulb, and projected the reflected light on to the white enameled still reflector, known in the trade as the "R. L.

M.," which was used with the lamps. The Cooper Hewitt lamp was equipped with the standard white enameled reflector supplied by the manufacturers.

Diffused sunlight admitted through one or two windows.

The wattage of the lamps was kept constant by the use of a rheostat, which was adjusted in accordance with the indications of a voltmeter in the case of the tungsten lamp, and an ammeter for the Cooper Hewitt lamp.

The room used for the experiments was 16 ft. square, with 10 ft. 6 in. ceiling, and had windows in the center of two adjacent sides, facing east and south, extending 10 in. from the ceiling. Each of the other sides contained a door. Walls and ceiling were painted light buff; floor Indian red; woodwork dark oak.

The apparatus was stationed on a small table placed slightly to one side of the center of the room, so that the electric light sources, which were suspended from the center of the ceiling, were entirely out of view of the observer, while shedding their light over his shoulder onto the test object. The apparatus was placed diagonally to the room, so that light from either window struck the test object at approximately the same angle as the artificial light, and so as to avoid any direct reflection from the observer's eye.

Adjusting and Measuring the Intensities of Illumination

The intensity of illumination on the test-object was regulated by lowering the lamps slightly for the higher intensities, and screening off a portion of their light for the lower intensities, in the case of the artificial light; and by adjusting the opaque shades of the windows by raising them from the bottom, in the case of sunlight.

The intensity of illumination on the test-object was measured with a Macbeth Illuminometer, which is a portable, equality-of-brightness photometer, using a miniature tungsten lamp run from a small storage cell as the standard light-source, a Lummer-Brodhun screen, and producing a balance by moving the standard light. In measuring illumination a disk of opal glass, having the surface sand-blasted, is placed on the given surface, and the brightness of the plaque balanced against the standard light. In measuring the illumination from mercury vapor light and sunlight, ray-filters were used to bring the color of the standard light to match that of the light measured. The instrument had been recently calibrated by the Electrical Testing Laboratories, New York City, a flicker photometer being used in determining the absorption coefficients of the ray-filters used in measuring mercury vapor light, and sunlight. Ten readings were taken of each intensity with each light, after the final adjustment, and the result was checked by an equal numbr of readings taken at the close of the series of observations.

Method of Carrying out the Experiments

The observer was seated in an arm-chair in front of the special apparatus stationed on the table. By slightly inclining the head the opening in which the test-object appeared was in the direct line of vision, the plane of the paper tape being substantially normal to the visual axis. The observer was instructed to adjust the distance from his eyes to the object for the clearest vision, which was done unconsciously after he became accustomed to the work. The electric key with which he registered his reaction was in the position at which his right hand would naturally rest when his arm was supported on the arm of the chair. It required a force of 200 gms. exerted through a distance 0.5 cm. to make contact.

The operator was seated on the opposite side of the table, with the key which controlled the first motion of the shutter within convenient reach, and the opening in which the duplicate numbers on the tape appeared in plain sight. The chronograph and clock were on a table at the side of the room, convenient to the operator, and connected to the apparatus electrically by a piece of flexible bell-wire. The voltmeter and ammeter were on the apparatus table, to which the rheostat was also attached, all within easy reach of the operator. The paper tape was passed under the shutter by being rolled from one drum to another by means of hand wheels at the side of the apparatus, convenient to the operator's left hand, and the shutter was set by being pushed back to its original position, in which it was held by a latch.

The illumination having been adjusted according to the prescribed conditions, the chronograph and clock were set in motion, with both pens in contact with the record paper on the cylinder. The observer was instructed that a succession of printed numbers would appear in the opening in the center of the board, and that as soon as he identified a number he was to press the key at his right hand, afterward repeating the number, so that the operator could check it against the duplicate number appearing at the back of the apparatus, thus making sure that it had been actually identified. The front-board of the apparatus covered the larger part of the visual field of the observer during his observations, thus insuring uniformity of contrast with the test-object, and entire absence of glare. All in readiness, the operator pressed the key, the shutter moved into its position with the opening disclosing a number on the tape; the observer identified the number, pressed the key which released the shutter so that it eclipsed the number, and repeated the number observed. The operator then reset the shutter, turned the tape-drums sufficiently to bring another number into

position, and the observer repeated his operations. This was continued until all the numbers on the tape had been identified by the observer.

Observers

In all, 5 observers were used. The first experiments were made with the 3 different lights, at a uniform intensity of 5 foot-candles, with all 5 observers. These initial experiments were considered rather as qualitative, to ascertain if any appreciable differences in reaction-times would appear, and if so, with what consistency of results. The results proving entirely satisfactory on this point, two of the observers were dropped in the remaining experiments, and their observations at this intensity were omitted from the final calculations. The results of their observations showed the same consistency in their averages and mean variations as those of the other observers in subsequent work.

The 3 observers used were all men, of various ages and vocations as follows: B, age 34, accountant; J, age 29, stenographer; O, age 54, salesman. All wore glasses during the observations.

Method of Measuring the Reaction-Time

The elapsed time between the presentation of the stimulus and the completion of the reaction is represented by the distance between two successive lateral movements of the pen on the chronograph record. The sum of 100 of these distances, representing a set of 120 observations less the first 20, was obtained by adding the individual distances mechanically by means of a a pair of dividers, the successive spaces being laid off along a line on a tape of paper.

The linear distance corresponding to 1 sec. of time was determined by taking the length of a line on the record traced during 10 min., as indicated by a stop-watch, and dividing it by 600. This distance (slightly over 1 in.) was used as the unit for making a scale by which the reaction-times, in the form of linear distances, were measured. The length of the line representing 100 observations, measured by this scale, thus gave the average reaction-time in sec. when divided by 100.

Method of Computing the Mean Variations

An apparatus was constructed, which consisted of a board 30 in. long and 4.5 in. wide, supported at an angle of 45° on a baseboard. A ledge was provided running lengthwise along the center of the board, and a piece of adding machine tape (white paper 2.25 in. wide) was stretched along the upper half, resting against the ledge, upon which was laid the scale of seconds. A slide having its edges perpendicular to the ledge was provided,

which could be moved along over the paper. A slat was attached to the front edge of the baseboard, which was beveled to 45°, which served to hold the chronograph records in place when passed under it, and afforded an accurate guide for the divider points in taking off the distances. A pair of proportional dividers was used, the short and long legs having a ratio of 1.4.

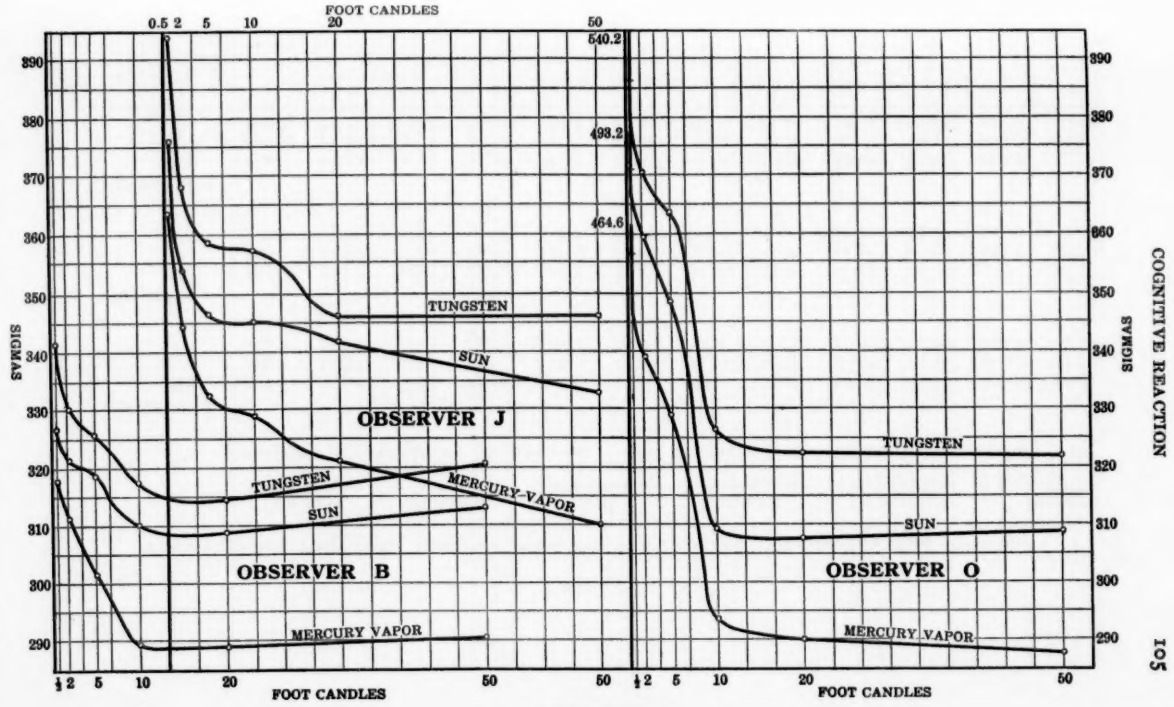
Setting the edge of the slide at the 0 mark on the left of the scale, the distance representing one reaction-time on the chronograph record was taken off with the short legs of the dividers, and pricked off along the lower edge of the tape, the slide being moved along the distance thus laid off. The distance between the points of the long legs of the dividers was then pricked off along the edge of the slide, perpendicular to the length of the tape. The second reaction-time was then taken off, added to the first in the usual manner, the slide moved up, and the vertical distance laid off against the slide as before; and so on for 100 observations. The total time was then measured on the scale of seconds, and the result, when pointed off, gave the average time in sigma.

Setting the short legs of the dividers to a distance representing this average time, the distance between the points of the long legs was used to set the 0 point on a small movable scale attached to the edge of the slide. The distance of any given point laid off along the slide from this mean value corresponding to the 0 mark on this scale represented the variation of that reaction-time from the mean. The sum of these variations was obtained by moving the slide the length of the tape, reading the distances of the points in like manner, and adding the scale readings. The total thus obtained was a linear quantity, and was reduced by the dividers, measured by the seconds scale, and pointed off for sigma, which gave the mean variation for the set of observations.

Number and Arrangement of Experiments

Six series of experiments were made at intensities of 5, 10, 20, 50, 2, and 0.5 foot-candles, in the order given. In each series results were obtained by 3 observers under the light of tungsten, mercury vapor and the sun. At 5 foot-candles 2 observers took 500 observations under each light; one took 300. At 10 foot-candles all 3 observers took 500 observations; at 20 foot-candles all 3 took 300; at 50 foot-candles all 3 took 300; at 2 foot-candles all 3 took 500, and likewise at 0.5 foot-candle.

Each series of experiments consisted of 120 observations made under each of the three kinds of light at the same intensity, by a single observer at a given sitting. The order in which the different lights were used was rotated in the different series. Practice series were taken until the m. v. of any set of observations was 10% of the average, or less.



CHARTS I, II, III

TABLE I

Visual Cognition Times under 3 types of illumination, at 6 intensities. Averages and mean variations

	Series 6 ½ foot-candle		Series 5 2 foot-candles		Series 1 5 foot-candles		Series 2 10 foot-candles		Series 3 20 foot-candles		Series 4 50 foot-candles	
	AVERAGE	MV	AVERAGE	MV	AVERAGE	MV	AVERAGE	MV	AVERAGE	MV	AVERAGE	MV
OBSERVER B												
Hg	318.4	31.42	311.2	25.98	301.8	21.30	289.8	18.00	289.3	17.80	290.3	18.90
S	326.8	35.02	321.6	24.62	318.5	23.50	309.8	19.60	309.0	19.30	313.3	23.70
T	340.8	36.94	334.8	27.28	330.6	22.50	316.2	21.10	314.6	22.20	320.6	24.10
OBSERVER J												
Hg	363.6	30.96	344.8	27.84	332.3	20.93	329.0	22.10	321.3	18.80	310.0	18.40
S	375.2	30.82	354.4	27.46	346.0	22.60	345.0	25.06	341.6	19.00	333.3	18.30
T	394.0	36.14	367.6	29.12	358.7	24.40	356.2	26.30	345.6	19.10	345.6	18.30
OBSERVER O												
Hg	464.6	56.74	338.4	27.50	327.2	25.60	293.6	20.50	290.0	16.80	288.0	17.40
S	493.2	71.42	359.0	32.30	347.5	29.62	309.2	20.60	307.6	18.40	309.3	19.30
T	540.2	65.12	369.2	31.90	362.2	29.14	326.0	25.20	322.3	25.10	321.6	20.20

In order to afford a "warming up" process before each set of observations, 120 reactions were taken, of which the first 20 were omitted in the calculations. The different series of experiments using different intensities of illumination were taken at widely separated times, extending over a period of 9 months.

Results

The general averages and the mean variations of the cognition times, under the 3 lights at the 6 different intensities, are given in Table I. The curves of the general averages of the 3 lights at the 6 intensities are given in charts I, II, and III, the illumination in foot-candles being plotted as abscissae, against time in sigma as ordinates.

TABLE II

The Difference, the Probable Error of the Difference,[16] and the Probable Correctness of the Difference,[17] between the Average Reactions under Mercury Vapor Light and Sunlight at 6 Intensities of Illumination

Intensities of Illumination	Observer B			Observer J			Observer O		
	Dif.	P. E.	P. C.	Dif.	P. E.	P. C.	Dif.	P. E.	P. C.
½ foot-candle	8.4	1.777	99.90	11.6	1.620	100.00	38.6	3.470	100.00
2	10.4	1.356	100.00	9.6	1.484	100.00	20.6	1.605	100.00
5	16.7	1.202	100.00	13.7	1.502	100.00	20.3	1.513	100.00
10	20.0	1.013	100.00	16.0	1.263	100.00	25.6	1.098	100.00
20	19.7	1.283	100.00	20.3	1.304	100.00	17.6	1.215	100.00
50	23.0	1.479	100.00	23.3	1.266	100.00	21.3	1.270	100.00

TABLE III

The Difference, the Probable Error of the Difference, and the Probable Correctness of the Difference, between the Average Reactions under Mercury Vapor Light and Incandescent (Tungsten) Light, at 6 Intensities of Illumination

Intensities of Illumination	Observer B			Observer J			Observer O		
	Dif.	P. E.	P. C.	Dif.	P. E.	P. C.	Dif.	P. E.	P. C.
½ foot-candle	22.4	1.832	100.00	30.4	1.769	100.00	75.6	3.266	100.00
2	23.6	1.428	100.00	22.8	1.524	100.00	30.8	1.593	100.00
5	28.8	1.171	100.00	26.4	1.567	100.00	35.0	1.431	100.00
10	26.4	1.052	100.00	27.2	1.298	100.00	32.4	1.227	100.00
20	25.3	1.390	100.00	24.3	1.307	100.00	32.3	1.474	100.00
50	30.3	1.499	100.00	35.6	1.266	100.00	33.6	1.303	100.00

TABLE IV

Ratios of the Cognition-Times under 3 Types of Illumination at 6 Intensities.

Intensities of Illumination	B			J			O		
	Hg	S	T	Hg	S	T	Hg	S	T
½ foot-candle	1.000	1.226	1.070	1.000	1.033	1.083	1.000	1.061	1.162
2	1.000	1.033	1.075	1.000	1.027	1.066	1.000	1.060	1.091
5	1.000	1.055	1.095	1.000	1.041	1.079	1.000	1.062	1.107
10	1.000	1.069	1.091	1.000	1.048	1.082	1.000	1.053	1.112
20	1.000	1.068	1.087	1.000	1.063	1.075	1.000	1.060	1.111
50	1.000	1.078	1.104	1.000	1.075	1.114	1.000	1.073	1.116

The reactions taken under mercury vapor light are shorter than those under sunlight, and those taken under sunlight are shorter than those under tungsten light. This relation is constant for all 3 observers at all 6 intensities, though the amount of difference as shown in Tables II and III varies with the light and with the intensity. It will also be seen that, in general, the reactions decrease in length as the illumination increases in intensity; this relation is true for all observers and all lights to an intensity of 20 foot-candles. From 20 to 50 foot-candles under tungsten light the reaction-time for one observer increases, one remains the same, and with one it decreases very slightly. Under sunlight the reaction-time of two observers increases; with one it decreases. Under mercury vapor light the reaction-time of one observer increases very slightly; with two it decreases.

Tables II and III show the difference between the averages of the cognition-times taken under mercury vapor light and sunlight and the difference between the average under mercury vapor light and tungsten, respectively, at the 6 intensities of illumination used, also the probable error of the differences, and the probable correctness of the differences between the sets of cognition-times. The probable errors are small (except in the case of observer O at 0.5 foot-candle, where the m. v.'s were exceptionally large, as were also the differences). The probable correctnesses are either a mathematical certainty, or approach the limit.

Table IV shows the ratio of the differences in time under the 3 lights at each intensity. These differences are smallest at the lowest intensity, and in general tend to increase with the intensity.

Sources of Error

Instrumental Errors include the following:

(1) Variation in rate of revolution of chronograph cylinder
(2) Error in linear distance representing 1 sec. of time
(3) Error in scale of sec. by which reaction-times were measured
(4) Variation in speed of shutter

Accidental Errors include:

(5) Errors in setting the divider points in taking linear distances
(6) Errors in reading the variations in reaction-time on the scale
(7) Errors in making photometer readings

Psychological Errors could arise from the following:

(8) Fatigue
(9) Visual adaptation
(10) Prejudice
(11) Physiological indispositions
(12) Practice
(13) Distractions

These sources of error will now be considered in detail.

(1) One revolution of the cylinder recorded 28 oscillations of the pendulum, which were shown on all records as taken as a check on the regularity of motion of the chronograph. Measurements of the distance between these 28 beats on all records taken showed a mean variation of 0.24 of 1%, and a probable error of .01 of 1%. Applied to the maximum and minimum average times this would give probable errors of .054σ and .028σ respectively.

(2) The results of 3 measurements of the number of pendulum beats recorded in 10 min. gave a m. v. of 0.21 of 1%, and a probable error of 0.625 in the unit of length representing 1 sec. on the scale. As before stated, this being a constant error, and therefore not affecting the differences, no special effort was made to reduce it.

(3) This is subject to practically the same conditions as (5): but the errors were constant as affecting the final results.

(4) This was not measured, as it was sufficiently rapid to produce instantaneous appearance of the stimulus, so far as visual perception is concerned.

(5) The error of a single setting of the dividers was within 5%. The reduction of this error by the canceling out of + and — errors in the 100 settings must bring it near the 0 point on the probability curve; so that the error in the average time was well within the limits of instrumental error.

(6) The same general conditions apply as in (5).

(7) The m. v. in reading photometer settings was 5%. Since the variation in reaction-time due to difference in intensity of illumination was relatively small, the errors in photometric readings are negligible.

In general, it would appear that the mechanical and personal errors of measurement, at least the variable errors which affect the significance of the results, are no greater than—probably not as great as—would have resulted from the methods and apparatus more commonly used for such experiments. There is no doubt that the labor of calculation was much less, and practically free from clerical error.

(8) Care was taken to avoid fatigue by giving rest-periods of 5 to 7 min. between the sets of observations, and two periods of two min. each during the observations. A comparison of the first 10 observations with the last 10 in a representative number of cases showed no discrepancies in average reaction-time, thus proving the absence of fatigue.

(9) The observers were in the room under the adjusted illumination from 5 to 10 min. before beginning their observa-

tions, in the case of the higher intensities, and longer at the lower intensities. The first 20 observations were omitted in the calculations to allow further for adaptation and practice. The comparison of times at the beginning and end of sets of observations, as mentioned in (8), applies equally in this case.

(10) Preference for any one kind of light might affect results; but in this case the effects would necessarily be very marked, and would undoubtedly appear as wide and erratic differences in the reaction-times. The fact that no such fluctuations appeared, but on the contrary the recorded times show a remarkable consistency, is sufficient evidence that they were not subject to the influence of prejudice.

(11) The observers were all in apparently normal health and spirits when making the observations. Furthermore, each observer made observations on 5 different days for each intensity, except the two highest, for which they made observations on 3 different days. The observations at the different intensities extended over a period of 9 months. The total results therefore represent an average which eliminates the factor of physiological abnormalities.

(12) The methods used to eliminate errors of practice have already been described.

(13) All points of mechanical impact in the apparatus were padded with piano felt, so that it operated without sensible noise of any kind. The room had no other occupants than the operator and observer during the observations. There was no glare in the field of vision of the observer, either while he was making his observations or during his rest-periods. The ticking of the pendulum, and the slight clicks of the chronograph magnets, were the only sounds in the room. The noises without were such as the observers were accustomed to hear regularly in their routine work.

Discussion of Results

That there would appear a difference in reaction-time between mercury vapor light and continuous spectra light was rather to be expected in view of the fact that monochromatic light increases visual acuity. It has been generally held, at least among illuminating engineers, that this gain in acuity was comparatively little in evidence at the higher intensities, but became appreciable at the lower intensities. It will therefore be a surprise to the practitioners of the applied science of light to learn that the difference in reaction-time between mercury vapor light and incandescent tungsten light increases with the intensity of illumination in two-thirds of the cases, which would seem to establish the rule. It will probably also be somewhat surprising

to learn that there is no appreciable difference in reaction-time between daylight and tungsten light under the same conditions.

Why these differences should exist is a matter for speculation rather than explanation. Until "the enigma of color vision," as Troland aptly puts it, is solved, an ultimate explanation is apparently impossible. We know, however, that vision by white or polychromatic light is a complex process, and that the visual impression received is the resultant of some kind of summation-process taking place either in the retina or at the cortical centers; and it is conceivable that this process requires time for its consummation. Vision by monochromatic light, not being the resultant of a complex stimulus, may therefore require less time. Purely nerve functions can hardly have any part in the phenomena.

The difference in time between daylight and tungsten light is less suggestive of explanation. There are three factors which may enter into the problem: the difference in color of the two lights will produce a slight variation in the contrast between the test object and the field (the figures and the paper); the two lights exert a different amount of energy for a given visible intensity; and the fact that the eye has been developed under daylight conditions may cause it to function more rapidly under such light than under a light differing in color composition. Which of these causes is operative, or whether all have a share in the result, will require special investigation to determine.

That reaction-time diminishes as the intensity of the stimulus increases is a well established fact, with which the results in the present case agree. The intensity of illumination necessary for minimum reaction-time under any given light does not appear to have been quantitatively determined heretofore. Rice proposed to determine the intensity of illumination of continuous spectra light (daylight and incandescent light) required for the "most efficient vision," by which he meant the greatest visual acuity. He states that, of the various uses of artificial light, the most important is that for reading. In view of the use of the artificial light in the industries, this contention can hardly be maintained at the present time. The fact that the best daylight conditions can be fully equalled by artificial light for the performance of manual labor is of such far-reaching importance as to be classed among the revolutionary improvements in industry, comparable with the use of the steam engine for motive power.

Cognitive reaction-time affords the only parallel to actual working conditions where the hand is directed by the eye; and the cases to which this does not apply, at least to a considerable extent, are comparatively few. The intensity of illumination required for minimum reaction-time is therefore the most reliable

guide for determining the illumination intensities required in industrial lighting.

From the results obtained in these experiments it appears that 10 foot-candles is the practical minimum required where sharp visual focussing is necessary, and the best conditions as to contrast in the objects seen, and sources of external disturbance, such as glare, etc., prevail. Rice concludes that "intensities of 8 and 40 meter-candles (practically 1 and 4 foot-candles) constitute approximately the lower and upper limits respectively of suitable illumination for ordinary purposes." These are much too low for industrial purposes, as the present experiments show, and as recent observations under practical factory conditions corroborate.

Conclusions

(1) Continuous spectra light produces a lag in cognitive reaction-time as comparable with the line spectrum light of mercury vapor of equal intensity.

(2) The light from incandescent tungsten produces a sensible lag in reaction-time as compared with normal white light (daylight, or diffused sunlight) of equal intensity.

(3) The differences in reaction-time, in general, vary directly with the intensity of illumination.

(4) The minimum intensity of illumination required for maximum visual efficiency in reaction-time is between 10 foot-candles and 20 foot-candles.

The writer wishes to express her thanks and obligations to Prof. H. P. Weld, Department of Psychology, Cornell University, for valuable advice and assistance in planning the experiments.

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[15]Computed by the formulae:

$$\text{P. E.} = \frac{0.8453 \text{ m. v.}}{\sqrt{n}}, \text{ and P. E. diff. A-B} = \sqrt{(\text{P.E.}_A)^2 (\text{P.E.}_B)}$$

[16]Computed by the formula given by Boring. *Amer. Jour. of Psych.*, XXVII, 1916, 315-19.

THE MIRACLE MAN OF NEW ORLEANS

By JOHN M. FLETCHER, Tulane University of Louisiana

During the spring months of the year 1920 there came to New Orleans an old man presenting the typical mien and make-up of a latter day prophet, who has made this city a rival of Quebec as a center for miraculous healing. It is reported that in 1903 the pilgrimages to the shrine of St. Anne de Beaupré, near Quebec, including persons who had been healed and those who were seeking to be healed, amounted to 168,000. No account has been kept of those who have visited the New Orleans Miracle Man, but if one were to include those who came merely to see what was being done it is very likely that the number would exceed the total of those who visited the famous Quebec shrine in 1903. It is interesting to note that the New Orleans Miracle Man is also of Canada, having been born there in 1847. In the veins of many whom he attempted to heal runs the blood of the exiled Acadians, who make up a considerable percentage of the population in certain regions of Louisiana. The 'Cajans', as they are known locally, include a large percentage of illiteracy and also a large percentage of those who cannot speak English. It would not be true to say, however, that only among the 'Cajans' was the faith in miraculous cures able to secure a foothold. There have been many persons of all nationalities, and representing all sections of the country and all strata of society, who have become converted to the belief in the old man's claims. A reporter on one of the city papers, who has recently come from New York, and who says his father was a physician, took the writer to task for asserting that there had been no authenticated case of the cure of an organic disease by the healer. Yet on the whole, as in all such cases, the great background on which the entire movement rests is one of ignorance and superstition. One does not have to do more than to visit one of the open-air demonstrations, and watch the types of faces uplifted in hope and the hands outstretched in pathetic appeal, to realize that this is true.

It has seemed to the writer that this case holds something that is of interest to psychology and that it should therefore be noticed and recorded. The social aspects of the case are now being investigated. Local psychiatrists are also seeking the

opportunity to make a study of it. The following account is given with a view to presenting merely the facts and general impressions of the event itself. This account contains the substance of a paper read before the Southern Society of Psychology and Philosophy at its annual meeting at Tulane University in April, 1920.

As to the Miracle Man himself it must be said that very little is known and very little can be found out. His real name is John Cudney, though on the occasion of his christening an older sister, who is reported by him to have had "foresight," said he was destined to be a prophet and wished him to be called Isaiah. In the family he was called Brother Isaiah, and it is by this name that he still prefers to be known. The circumstance of his christening in this fashion and the force of the suggestion in his name seem to have had much to do with determining his career.

In his early life he made, so far as has been ascertained, no attempts to effect cures, or to exercise any other unusual gifts.

From Canada he came to America some time in his youth. As a young man, while walking alone in the woods of Nebraska, he claims to have heard a divine voice telling him that he was called upon to heal people of diseases. This seems to have meant to him that he should desert his family. He relates that he agonized with God over this matter far into the night, but arrived at no solution. The following morning his wife, who seems also to have had the same revelation about him, announced that she and their sons would have to give him up so that he could devote the rest of his life to the work to which he had been called. Since that time he has traveled in many parts of the world healing by prayer and, like the apostles of Christ, earning his living meanwhile. He has apparently operated in many other American cities, although not so conspicuously as in New Orleans. In certain instances he seems to have been "invited" to leave by the city authorities.

In spite of his popular title of the "Miracle Man," he does not lay claim to performing miracles. He says that the power to heal diseases comes to him periodically, but that all he does is done through the goodness of God. He disclaims being a Christian Scientist, though like the members of that communion he believes that God does not will disease. The truth of the matter seems to be that he is probably incapable of working out any consistent notion of what he proposes to do. He uses an oil of wintergreen to rub those whom he treats, but he says that this has no curative properties, and is merely to decrease friction. He makes use of magic by blessing handkerchiefs and sending them to patients who are not able to reach him. In watching his healing one day the writer heard him speak of epilepsy as demonic possession. He said, "I have had a great

deal of experience with them cases. And I tell you when them epilektic fits come out they makes a lot of noise." He presents all the appearances of being a devout, simple-minded religious fanatic. He could easily have made a Peter the Hermit or a St. Simeon Stylites. Those who know him privately and intimately speak well of his character and absolve him from conscious fakery. Whether he can survive the notoriety thrust upon him remains to be seen. He has been repeatedly offered money, but either from fear of the law or from principle he seems to have refused it, though he does accept gifts. There are rumors that he has received money, though these are difficult to prove. Temptations of a sex character are also assailing him. Certain of his female 'cures' do not hesitate to kiss him and fondle him in public. This, coupled with the fact that he preaches that a wife should leave a husband if God calls her, makes it entirely possible that the matter may at any time have a sudden and unsavory ending.

The story of how he came to attract such extraordinary attention not only illustrates the human craving for the supernatural but at the same time indicates the responsibility of the public press, a responsibility which is not always fully appreciated. For several days the papers of New Orleans debated among themselves whether they should give publicity to what was being done. They presently decided in the affirmative; and about the first warning that the public had was the burst into print of accounts of wonderful cures effected by a strange old man in a little house-boat on the mud banks of the levee at the foot of Calhoun Street. These accounts produced a marked impression on the entire city. Everywhere on the streets and in the homes people were talking about Brother Isaiah. Through the press dispatches reports went to other cities. Moving-picture concerns seized upon the new sensation and scattered the distorted rumors still further. Even the billboards of Broadway, New York, gave space to this thriller.

It seems that the healer had been at work for some time prior to his burst into notoriety. He had in fact been to New Orleans once or twice before and had made acquaintances along the river-front. His reputation began to grow in the earlier months of this year to such an extent that it became necessary to call extra police-help in order to disentangle the automobiles that came to his home. There was even at this stage a curious mixture of the poor and the rich among his patrons. Some hobbled on foot, others came in elegant limousines. The people who first went to see him were those interested in being healed or in having some member of the family treated. After the front-page account in the newspaper came out, the health-seekers were joined by a throng of the curious. Extra street-cars were

put on the lines leading to that portion of the river front. Great masses of pedestrians and people in automobiles crowded the levee daily. The number of persons seeking treatment assumed alarming proportions. The sick began to arrive on all trains, without taking the precaution to make inquiry about accommodations. The charitable organizations, the hospitals, the Red Cross, and the city officials found themselves with a problem on their hands. Letters, telegrams and long-distance telephone calls poured into the offices of the newspapers; they had apparently got more than they bargained for. Conditions of great distress began to spring up about the old man's place of operation. Invalids who perhaps had not left their rooms or beds for months came and stood for hours in the cold March wind and sometimes in the rain awaiting their turn. Patients who were almost delirious with fever would stand with their head on the shoulder of a relative in the long line of suffering. An occasional groan of pain would elicit the comforting statement that their turn would come soon. No toilet accommodations had been provided, much less any shelter or food. It became a problem of serious concern to the State Board of Health. It became necessary to protect the health of the community, and at the same time it seemed wise to avoid any appearance of persecution of those who were holding with mad fanaticism to the faith of the old healer. One can imagine how unsanitary the whole procedure was when told that he was rubbing and manipulating his patients one after the other all day and most of the night without even washing his hands. It was reported that leprosy had appeared among his patients. On account of these dangers it became necessary to remove the tents that had been set up by the Red Cross on the levee for the protection of those who had left their homes to come for the treatment.

In the height of the excitement of the early days of his recent popularity one could hear on all hands wonderful stories about what the 'miracle man' could do and had done. Some said he was Christ appearing on earth again. The story went around that he had once stopped a shower of rain by holding up his hand. The credulity and the will to believe upon the part of the well, and the desperate hope of the sick, made out of the situation a veritable rumor factory. An appreciation of the setting of this case seems to be necessary in order to get an idea of the atmosphere out of which these rumors grew. Miss Doris Kent, a former student of the writer and a graduate of Newcomb College, Tulane University, was assigned by the Times-Picayune of this city to write the matter up. She remained on the assignment until threatened with violence by one of the self-appointed managers, who was suspected of carrying on a petty graft-scheme by which he could for a consideration secure

prompt attention from the healer. Miss Kent thus describes the situation as she saw it March 13th:

"Steadily swelling crowds, excitement rising to white heat throughout the city and community, dozens of new 'cures' and a few bits of conflicting testimony were results of another day and night of 'faith healing' on the levee off Audubon Park, where John Cudney, or 'Brother Isaiah,' has worked steadily for three days and three nights, praying for the healing of the sick and the defective.

"His great frame sagging slightly with weariness, his face almost as white as his long hair and his snowy beard, the old riverman had hardly paused for rest or food since the first rush upon his little houseboat began Wednesday afternoon. As he prays over some twisted form on a little rudely-erected platform in the mud, hemmed in so closely by the crowd that scarcely a breath of air reaches him, he pauses for a moment to swallow a few mouthfuls of orange or pineapple juice, passed to him over the heads of the crowd. Back in the tiny houseboat, that was almost sunk Thursday, when the mob pressed aboard, Mrs. Coldberg, the 77 year old sister of the 'healer', prepared the only nourishment he found time to take."

The following is given as a picture of what the situation looked like March 14:

"Paeans of joy from men, women and children who professed to be cured in an instant by 'Brother Isaiah's' powers continued to go up from many sources Friday.

"Watch fires were built all along the levee and down on the river beach late Saturday night by those who were determined to obtain close-up positions when 'Brother Isaiah' resumed his practice, which it was said he would do early Sunday morning. The bivouac of the 'faithful' presented a weird appearance, and hundreds of sight-seers journeyed in automobiles to look on the strange scene. Carnival and the Day of Judgment combined best expresses the atmosphere on the Audubon Park levee Saturday, when 5000 persons at one time gathered to witness the 'faith healing' of John Cudney, the 'Brother Isaiah' who has thrown the city into a turmoil with his alleged 'cures'.

"By nightfall (of March 16) a village of little white tents had sprung up like a growth of mushrooms along the embankment. The American Red Cross has contributed ten tents and one hundred cots, and will provide more if necessary to house the unfortunates whose hope drives them to remaining at their posts day and night.....A large platform will be built for him later, since the 'healer' has refused all offers of a hall, declaring that he must do his work in the open air on the spot where he first began.

"Surroundings rapidly are becoming dangerously insanitary upon the levee. Since Sunday the spot has taken on the aspect of a lot just vacated by a circus. The ground is trampled bare for a long distance, and every vestige of grass has been wiped out by the thousands of feet. The waiting line stands at the foot of the levee toward the river, and in the hollow has collected a drift of tattered papers, rotting fruit, fragments of food, broken bottles, torn boxes,—all at the feet of the wretched ones who have stood for more than twenty-four hours packed between the ropes about the runway. In the sultry, humid atmosphere of Monday afternoon the place was repellent to every sense, yet the dreary line still stood with abject patience, scarcely speaking among themselves or noticing the reduced ranks of the sightseers who stood on the higher ground.

"Petty commerce thrives all around the outskirts of the crowd about the 'miracle man'. The peanut, popcorn, soft drink, and fruit wagons are

there and the latest addition to that thoroughfare is an array of photographs of Brother Isaiah at work. They hung artistically upon the red brick wall of the Marine Hospital."

With reference to the reputed cures it seems quite difficult in this instance to find even the kernel of truth which must as a rule constitute the basis of fact upon which such excited rumors take their rise. It is needless to say that no organic diseases have been successfully treated by this healer. Out of the vast numbers who have been to him for treatment there must have been a percentage of cases of a functional character, which were amenable to just the kind of treatment he offered. But when one starts out to locate these cases they are difficult to find. One can find all sorts of stories about what was said to have been done, but substantiated instances are not so easy to find. And the interesting aspect of the case is that the minds of the crowds did not seem to need substantiation. They were quite ready to believe the miraculous reports without it. If one accepted the verdict of the crowds that surrounded the old man in the earlier days of his work here one would have to believe that tuberculosis, cancer, paralysis, Bright's disease, blindness, deafness, dumbness, and practically all other forms of human affliction yielded with equal readiness to his methods.

The case that gave the initial impulse to the wild rumors of the earlier days was that of a little girl who was born blind and who was reported to have had her eye-sight restored. The rumor of this cure flew like wild-fire over the city. This was followed by other reported cures in such rapid succession that it has never been possible to check up the case to see what the facts were. It sounds very similar to many other cases that were investigated and found to have no basis of fact whatever in them. There is at least one case in which subsequent investigation confirmed the rumor that a cure had been effected. This was the case of a man who had what was called rheumatic paralysis, and who had been unable to dress himself. He seems to have been cured and to have remained cured up to date.

The cases that were reported as cures were very numerous. A sample of this kind of cure, and at the same time a sample of the typical behavior of the crowd-mind, are afforded in the case of Benny Wilson. It seems that this young man had been a cripple since he was five years of age. He made his way to 'Brother Isaiah' on March 13th, and after much difficulty secured treatment. The crowd was much interested in Benny's case, and in general quite excited. After the treatment a dense crowd flocked around him in intense curiosity. They shouted, "He is walking!;" others said, "No, he is running!" Women screamed, while men swore terrible oaths to give vent to their feelings. The crowd was so thick about him that it was

quite impossible for anyone to see what was going on, but from those who were near him it was subsequently found out that he had neither been running nor walking, but that he had been carried forward bodily by persons who had caught him under the arms. It was stated that it was doubtful whether his feet touched the ground at all during this exciting journey. Before he reached his home the rumor came back that he was in the same condition as before the treatment. A man is reported to have gone up for treatment of cross-eyes. The crowd, having forgotten what he was being treated for, and having taken him for a paralytic, shouted "another miracle" when he walked away. Another case of this character is that of an imbecile girl who was dumb. She was brought by her mother to be treated. While waiting on the outskirts of the crowd she began to mutter, doubtless in her usual fashion. The crowd took her to be a 'cure' and began to gather around her to hear her verbigerations. She naturally grew excited and talked the more vehemently. The mother strove in vain to tell the crowd that the child had not even seen the miracle man.

The extent to which the excitement and bewilderment penetrated the city is illustrated by the story of the man who had some time ago lost one eye. Without the knowledge of his wife he had a glass eye inserted. When he went home at night his wife asked in surprise what had happened to him. He replied that he had been treated by Brother Isaiah. Before he could control the situation his whole family fell on his neck and rejoiced.

The Chief of Police of New Orleans sent a test case about the middle of March in the person of Mr. John Mayes, formerly conductor on the Illinois Central Railroad. Mr. Mayes had suffered a stroke of paralysis about a year previously, which resulted in hemiplegia of his right side. His speech has also been interfered with, so that he is able to say only two words, 'no' which he repeats over and over, and 'Lee' the name by which he now designates his wife. For three days he had waited his turn for treatment. Both he and his wife had the utmost faith that the treatment would be successful. When his turn finally came he was carried onto the pier by the negro body-servant who is his constant attendant, and was placed in a chair in the presence of the healer. The account of the treatment of this case says:

"The afflicted man sat with his eyes glued to the face of the 'healer' while hope fairly blazed from them. Back of him his wife stood, with hands clenched tightly together, whispering encouragement. The 'miracle man', gaunt and weary, in his long blue garment, like the apron of a surgeon, bent over him with faith as fervent as the hope of the patient. Kneeling beside the chair, the big negro, his hands trembling with excitement, gently removed the overcoat and coat of the paralytic and held the little bottle of oil while the 'miracle man' rubbed the afflicted shoulder and forehead of the

patient. After several moments of prayer he suddenly looked into the eyes of the patient and cried, "Say your name, say John!" The throat of the paralyzed man contracted and swelled with the effort; his eyes never left the eyes of the 'miracle man', but the only sound that came forth was "No! no! no!" "Yes", cried the healer, "Not no! say yes!" Painfully the man tried again and again, but his eyes filled with tears as he failed again and again. "Say Praise God!" the healer cried again. "Call upon the Lord, my brother!" But the name that forced itself from the agonized lips of the paralyzed man was the name of the wife behind him, who burst into tears at the sound. The old healer in his anxiety to help the man made a figure almost as tragic as the other two. He tried again and again, with prayer, encouragement and friendly urgings, but at last the paralytic was carried away in the strong arms of his servant with the promise of 'later treatment', which perhaps would be effective."

These test cases did not daunt the courage of the healer nor end the expectation of the believers.

The case of Emile Lacoume is of interest. Lacoume is the locally well-known blind newsboy-musician, who is reported to be one of the first introducers of that world-renowned New Orleans product, jazz music. When a newsboy on the streets he is said to have attracted the attention of Olga Nethersole and also of Sarah Bernhardt, each of whom desired to send him away to be educated in the schools for the blind. After being treated by the healer, Lacoume was told to go to his home and keep his eyes closed for 24 hours, then pray and open them. These instructions he carried out with eager care and interest, only to experience the terrible shock of disappointment in the end.

The recent stages of the work of the miracle man have been characterized by increasing doubts concerning his powers, though he still has a nucleus of followers who hang on his lips for every word he utters in his disconnected sermons. The reverence and breathless awe which formerly characterized the attitude of the crowd toward him personally have markedly decreased, so that certain of his Italian patients seem to have threatened to "get him" for discriminating against them.

The moral which is apparent in this case scarcely needs to be pointed out. The lay public cannot easily be disturbed nowadays by the superstitions of the Middle Ages when it comes to organic diseases, such as infections and the like. General knowledge of this class of diseases has spread very rapidly, especially within recent years. The old-time medicine man has gone out of business. But when it comes to the mental side of disease there is still a lack of training upon the part of the average physician, and a susceptiblity to the wildest superstitions upon the part even of intelligent laymen. In the realm of mental diseases it is not only possible for dignified cults which are indefensible in the light of modern knowledge to thrive, but we are actually left with primitive medicine men on our hands. John Cudney, alias Brother Isaiah, is one of them.

AN EXPERIMENTAL STUDY OF THE PERCEPTION OF OILINESS

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Introduction

In reviewing the literature on 'touch blends', we found that the only experimental work on the subject is that of M. Bentley.[1] Upon repeating Bentley's experiments, in which he paid especial attention to the perception of liquidity, we became interested in the 'oily' experience, which seemed to be a true perception, on a par with Bentley's perception of wetness. Accordingly, we determined to follow up the hint obtained in our brief experimentation by a thorough study of oiliness. First, we sought to analyze the perception into its sensory components, in order to determine the compulsory conditions for the oily perception. Secondly, we wished to synthetize our components in such a way that our *O*s should be *compelled* to perceive oiliness, even though, physically speaking, there was nothing oily present in the stimulus.

I. *Analysis of the Perception of Oiliness*

We spent four months of the academic year 1920-21 in analyzing the perception of oiliness, and the following two months in synthetizing. There were four *O*s in the first half of the work: Dr. A. H. Sullivan (Su), instructor in psychology, Miss Lillian Cobbey (Co), assistant in psychology, and the Misses E. G. MacArthur, (Ma) and S. Chapman (Ch), seniors and majors in psychology. In the second half of the work, we added a new *O*, Mr. J. P. Nafe(Na), a graduate student in the department, who served as a check on our synthetic conditions inasmuch as he had no previous experience in analyzing the oily perception.[2]

The *O*, blindfolded, sat with right arm resting comfortably on a raised arm-rest, with the middle finger of the right hand extending downward through a hole in a board which served as a finger-rest and as a means of keeping the finger perfectly still

[1] M. Bentley, "The Synthetic Experiment," this Journal, ix., 1900, 414 ff.

[2] When the regular *E*, Co, acted as *O*, Mr. O. De Motte acted as *E*.

E said, "Now," and then slowly and evenly, by means of a pulley, raised a small cup, set on an inclined board, until the finger was immersed in oil up to the first joint. The finger remained immersed from 2 to 10 min., while the *O* described his experiences. The two *O*s, Su and Co, knew, of course, that oily substances would be presented for report at times, but they did not know at what times, since other liquids were run in as checks. The other three *O*s had not the slightest hint that oil was used, all of them coming to a realization of the oily experience with a certain amount of surprise, because they were more or less 'set' for water or a similar liquid, having had some practice in reporting upon wetness in another experiment which was going on in the laboratory.

Experiment I

In our first experiment we used olive oil, kerosene oil, paraffine oil, and water. We asked our *O*s to report upon their sensory experiences, and then, if possible, to name the perception. We found that it was easier for the *O* if we allowed him to shift attitude several times during an experiment, now naming the perception, now reporting the sensory experiences on which the perception was based.

It became evident very soon that all our *O*s felt oiliness as a unique experience or true perception, not at all dependent upon movement. Always they analyzed this perception into warmth and light pressure. When the finger was first immersed in the oil the *O*s reported cold and pressure, and they named the experience 'wetness'. Then, as the finger remained in the oil, the temperature changed from coolness to warmth, and the pressure became 'snug'. Not, however, until these two qualities were properly fused or blended, did the perception become one of oiliness instead of wetness.

The reports ran very much alike for all *O*s. Examples are the following:

Ch, olive oil (30 sec.) "Cold and a little pressure, wet under the nail." (1 min.) "The finger is becoming gradually warmer and seems oily." (5 min.) "The pressure is light and even all around the finger; there is warmth too, and it feels oily."

Co, paraffine oil (30 sec.) "I feel nothing at all." (1 min.) "The finger is warm up to the base of the nail where there is a ring of pressure." (2 min.) "Now it feels oily; the pressure at the tip is getting tighter." (3 min.) "A warm pressure is blended well all over the finger, it is close-fitting, and it feels oily; that oily feeling seems to go all over me like a kind of nausea."

Ma, olive oil (30 sec.) "I felt it roll up on my finger, piling each roll on the last; that isn't like water." (1 min.) "It is cool and thick (because the pressure is more intense at the bottom of the finger)." (3 min.) "The pressure is air-tight and evenly distributed; there is a suffocating warmth too, and it feels oily." (6 min.) "There is that same warm even pressure, and it seems oily."

Su, paraffine oil (30 sec.) "One spot on the finger feels wet, where there is a spot of cold surrounded by a feathery, lacy pressure." (1 min.) "There is pressure, very weak in intensity, which I cannot localize; there is no temperature connected with the pressure, and it no longer seems wet." (4 min.) "Snug warmth blended with pressure; the finger feels very oily." After the cup is lowered, some oil still adhering to finger: (1 min.) "The warmth is rather intense, the pressure weak, yet I do feel pressure. Still oily." (3 min.) "Hardly any sensation, just a little warmth; no perception." (4 min.) "Now there is a little cold at the tip of the finger, and a slight pressure, and it feels wet. Wetness, for me, is as if the cold crystallized and touched the finger."

Su, olive oil (30 sec.) "Cold and pressure; wet." (1 min.) "Now there is warmth and pressure and it feels oily. There is one cold spot on the back of the finger where it feels wet: but the rest of the finger is oily. The warmth and pressure seem to be woven together into a fine texture." (2 min.) "All cold has disappeared; the warmth is quite intense; as the warmth increases in intensity the oiliness becomes clearer. The warmth is deep, under the skin." (4 min.) "Still feels oily although the warmth is now less intense than the snug close-fitting pressure." After cup of oil is lowered: "It does not feel oily now; it is more like having the finger extend into warm air; the pressure is not intense enough for oil."

The significant thing about these reports is not so much the fact that all *O*s reported warmth and pressure when they experienced the oily perception, although this is important, but the fact that they all reported a *blend* of the two sensations. In looking over the reports quoted, which are very much like the reports in general, we find such expressions as these: "a warm pressure is blended well all over the finger; it is close-fitting;" "the pressure is air-tight;" "there is a suffocating warmth;" "that same warm even pressure;" "snug warmth blended with pressure;" "warmth and pressure woven together into a fine texture." These descriptions, coming as they do from different *O*s, and in spite of the fact that oils of different weights and textures were used, show that the oily experience is indeed unique, being either a pressure that is so snug or air-tight that it is warm, or a pressure that is snug because it is warm; the fusion becomes as it were one sensory quality, so that the expression "warm pressure" very aptly describes it. The snugness does not mean an intense pressure, but a light, veil-like pressure that is close-fitting.

Experiment II

When we had thrown in warm water as a check upon our *O*s' reports, in the first experiment, we found that all *O*s reported the oily perception at times when the stimulus was warm water. Our next problem was, then, to ascertain at what temperature water is perceived as oil, as well as to find, if possible, why oil and water of a certain temperature are perceived alike. Since oil was always reported as cool when the finger was first immersed we decided to use water at 32° C which should be gradually

heated, in order to simulate as nearly as possible the experience reported when oil was the stimulus.[3]

We found that all four *O*s perceived water at 32°C as 'wet'; but, as the temperature of the water increased, the wetness disappeared and the perception changed to 'oily'. Of course, there were slight individual differences in the temperature at which oiliness was perceived; but generally speaking all *O*s reported the perception when the temperature was 38° or 40° C. And always, when oiliness was reported, it was analyzed into warmth *plus* pressure. The following table gives a summary of the results for the four *O*s.

TABLE I. WATER SLOWLY HEATED ON FINGER

Obs	Temperature[4]	Observer's Report
Ch	32°-35° C	Coolness and light pressure; wet.
Ch	38°-40° C	Warmth and weak pressure; oily.
Co	32°-34° C	Cold; light pressure; wet.
Co	36°-42° C	Warmth; tight, close-fitting pressure; oily.
Ma	32°-36° C	Coolness; light pressure; wet.
Ma	39°-42° C	Warmth and light pressure; oily.
Su	32°-34° C	Clear cold, pressure in a ring and spots; wet.
Su	35°-39° C	Warmth and light pressure; oily.

We have chosen at random samples of the running reports of our various *O*s when water slowly heated was used as stimulus. The samples follow:

Ch (32° C) "There is cold and light pressure and it feels wet." (33° C) "The awful biting cold is disappearing; still wet." (34° C) "One spot on the tip of my finger is cold; the rest is warm, but the finger still feels wet." (36° C) "The finger feels cold and warm alternately; feels wet under the nail." (37° C) "Begins to feel warm all over." (38° C) "The warmth and pressure are blended now, and give a lovely oily perception."

Co (32° C) "Very cold and wet." (34° C) "The tip of the finger feels warm, with a snug, tight-fitting pressure which blends with the warmth and seems oily; but higher up on the finger, there is cold with a ring of pressure, and it is wet." (36° C) "Oily, with a warm close-fitting pressure all over the finger."

Ma (32° C) "Cold and lots of pressure; wet." (34° C) "Not so cold, and the pressure is getting light and tickly; still wet." (38° C) "Getting warm; still some pressure; feels moist rather than wet." (42° C) "Feels funny and heavy and warm and oily; it is a thin oil." (44° C) "Still feels slightly oily, but it is getting too hot and the perception isn't as plain."

Su (32° C) "There is a very intense, clear cold with little spots of pressure scattered around in it, and a ring at the top; wet." (34° C) "The wetness has disappeared except for one spot at the side of the finger nail."

[3]We tried various devices for gradually heating the water; first we used a kerosene lamp, then an alcohol lamp, and finally we perfected an electric heater which could be placed under the cup, and which gave the water a slow and gradual warmth.

[4]We must ask the readers of this Study to regard the temperatures as approximate only. We have reason to believe that the thermometer employed had a constant error, whi ch we have so far been unable to determine.

(35° C) "Begins to feel like oil; there is a slight warmth and pressure." (37° C) "Oily; pressure and warmth blended." (38° C) "Very good oiliness; warmth and pressure cover whole finger." (39° C) "There is definite pressure and warmth, but it does not feel oily, neither does it feel wet. I cannot name the perception, but it is rather like glycerine."

The table and the reports give added support to our belief that oiliness is a fusion of warmth and pressure. The conditions for the fusion seem to be a warmth and a pressure of such an intensity that neither one stands out from the other; it is, in other words, a matter of about equal vividness of the two qualities. In the light of our results, we may say that water of a certain temperature is not 'wet' at all but 'oily'; the pressure in the 'wet' complex is not different from that in the 'oily' complex; the latter is called snug because it is blended with warmth.[5]

II. *Synthesis of the Perception of Oiliness*

Now that we were certain of our analysis, we wished to synthetize the oily experience by stimulating a pressure spot and an adjoining warm spot with a 'dry' stimulus. We realized that our great difficulty would be to get a blend or fusion of the two sensations. We decided to work on the back of the hand where pressure and warm spots could be located easily.

Experiment III

We found pressure spots and adjoining warm spots for all five *O*s and marked these with indelible ink. We tried a small camel's hair brush as a stimulus. This we plunged into hot water, dried quickly, and then applied to the pressure spot. This method did not prove very satisfactory, for it demanded great patience and care to suit individual sensitivity. Every *O*, however, reported the oily perception a goodly number of times. Of course none of the *O*s knew whether we were using oil or something else as a stimulus; when the writers observed, we sometimes used drops of oil in order to keep them in ignorance of the actual stimulus. The following table gives the results of Experiment III.

Table II. Warm Brush Applied to a Pressure Spot

Obs.	No. of Exps.	No. of times 'oily' perceived[6]
Ch	25	10
Co	12	10
Ma	20	10
Na	30	10
Su	15	10
Total	102	50

[5]One of the writers has often observed that a lukewarm bath actually feels oily if the eyes are shut and associations are, so far as possible, banished from the mind.

[6]Since our time was limited, we set ourselves the task of obtaining, if possible, 10 cases of correct synthesis from every *O*. Hence the number in the last column is always 10.

The reports ran somewhat as follows in all the experiments:

Ch, "It doesn't feel oily until the temperature and pressure are just right; then it seems oh! so oily, just like a drop of oil on the hand."

Co, "At first there is warmth around the edge with slight pressure in the center; then suddenly the two blend and give a lovely oily perception."

Ma, "Sometimes there is just warmth and pressure, but no perception of any kind. But when the two blend into a snug warmth, or a fairly tight pressure that feels warm, it feels oily."

Na, "I get pressure and warmth and then oily—it might be warm water —no, it is more like coal oil, or even a little heavier oil than that."

Su, "At first I feel only warmth and pressure; when they 'jump together' it feels oily."

Experiment IV

Not satisfied with the results of Experiment III, where we obtained the oily perception in 50% of the cases only, we now tried a temperature cylinder for stimulus. After heating the cylinder in boiling water, and drying it, we applied it to a hair which was near a warm spot. Our pressure sensation came from the pressure of the cylinder on the hair, while our warmth came from the radiant heat of the cylinder. Here we had not only a 'dry' stimulus, but also a stimulus which did not touch the skin at all. We found slight individual variations in sensitivity, but in all cases we found that a pressure on the hair great enough to bend the hair in the windward direction until it stood perpendicular, or a little beyond the perpendicular, was necessary before the oily perception was reported. The cylinder had to be within 1/16 in. of the skin in order to give the proper intensity of warmth. When we took care to secure these necessary conditions we were very successful in our results, the *O*s failing to report the perception only when the warmth or pressure was not of the right intensity, or, in a few cases, when the two qualities did not fuse.

The following table gives the results of Experiment IV.

Table III. Hot Cylinder Applied to a Hair

Obs.	No. of Exps.	No. of times 'oily' perceived
Ch	15	10 or 66%
Co	15	10 or 66%
Ma	14	10 or 71%
Na	25	10 or 40%
Su	10	10 or 100%
Total	79	50 or 63%

Since Na entered the experiment late, and had no experience in observing before coming into the experiment, it may not be quite fair to include his results with those of the more experienced *O*s. If we omit his results from the table, we find that out of 54 experiments the four trained *O*s reported 40 cases (74%) in which they perceived oiliness.

Examples of reports in Experiment IV are:

Ch, "There is warmth and pressure; as soon as they blend it feels oily."

Co, "That is the best oily perception I have had. The oily perception comes rather suddenly, just as if a whole lot of oil were put on the hand; then later I analyze it into warmth and pressure."

Ma, "It feels like oil on a tiny spot no larger than one half a pin head."

Na, "It feels very oily on the back of the hand."

Su, "There is a smooth light pressure and a warmth which are blended. It is like a drop of oil. The drop of oil stays for some time." [The last sentence was reported after the cylinder was removed.]

It is evident from the table and the introspections that the heated temperature cylinder secures the compulsory conditions for the perception of oiliness.

The experiments above described were performed in ignorance of the work of R. S. Malmud (this JOURNAL, xxxii., 1921, 571 ff.), who attempted by simultaneous punctiform stimulation of warmth and pressure to obtain a perception of warm-wet. The attempt failed; and Malmud concludes, admittedly with some surprise, that "there seems to be no typical experience of warm-wet." She and her *Os* were, evidently, not looking for the perceptive meaning of 'oiliness'. We believe, however, that there are hints of 'oiliness' in certain of her reports, and especially in the experiments described toward the end of her paper. Malmud obtains, as we did, a true blend or fusion of warmth or pressure, and our positive result appears to be the complement of her negative conclusion as regards wetness. We hope that her experiments may be repeated with the possibility of an 'oily' quality or integration in mind.

Conclusion

1. Oiliness is a fusion of warmth and light pressure; this fusion comes as a unique experience, being, it seems, an intermediate sensory quality rather than a perception.

2. Whenever we have the right combination of warmth and pressure, we perceive it as 'oily', whether the actual physical stimulus be oil, water, or a dry, warm temperature cylinder.

3. The compulsory conditions for the perception are:

(*a*) warmth of about 38°C—40°C;[7]

(*b*) light pressure, such as that experienced when a hair is lightly stimulated;

(*c*) the two sensory qualities of such collocation and intensity that they are blended or fused into a "warm even pressure."

[7] See Note 4 above.

MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF CORNELL UNIVERSITY

LV. Cutaneous Localization and the "Attribute of Order"

By H. M. Lufkin

In 1911 H. J. Watt proposed to add an original attribute of 'order' to the recognized list of sensory characters.[1] We believe that the addition is unwarranted. A Minor Study is not the place for systematic discussion; but we may touch very briefly upon the principal questions at issue.

(1) Watt has failed to realize that quality is itself an orderly attribute. All the visual qualities, e. g., have their determinate 'places' in the color pyramid; and a like law holds for smells and tastes (Henning) and probably for touches (Titchener). The isolated quality (as, e. g., Watt's "quality as such or mere sound") is by all analogy suspect. We expect in every case to find one or more qualitative series; we expect that auditory qualities will show an orderly arrangement; and Watt's "order or pitch-place" need therefore be nothing more than differentiated auditory quality. (2) Kaila has shown, in the crucial instance of crossed and uncrossed double images, that a different spatial localization of identical visual impressions may be explained physiologically, in terms of an 'empiristic' theory.[2] What holds of the two retinas will hold also of the two hands, etc. We need not commit ourselves outright to Kaila's view; it is enough for the present purpose to note that it offers a reasonable alternative, in the field of spatial perception, to Watt's postulate of an attributive 'order'. (3) Descriptive psychology knows less of protensive than it knows of extensive sensory experience. There is, however, so far as we are aware, no experimental evidence of an attributive basis of temporal order, while there are many experimental indications that this order is perceptive.—Aside from these special considerations (4) we cannot convince ourselves that order stands, as an attribute, on the same logical level with the acknowledged attributes of sensation.

The present Study is concerned with one of Watt's particular illustrations. "On the skin," he remarks, "it is found that every nerve-ending and every touch-spot can be distinguished from every other, with the exception, perhaps, of those that lie too close together to allow of isolated stimulation."[3] The statement repeats a generalisation of Thunberg's;[4] and Thunberg is repeating, somewhat uncritically, statements of von Frey and Metzner. These investigators, who worked only on the middle third of the forearm and (to a less extent) on the wrist, conclude from their results that "am Unterarm, *und wohl auch sonst am Körper*, wo es gelingt benach-

[1] H. J. Watt, The Elements of Experience and Their Integration: or Modalism, *Brit. J. Psych.*, iv., 1911, 127 ff.

[2] E. Kaila, Versuch einer empiristischen Erklärung der Tiefenlokalisation von Doppelbildern, *Z. f. Psych.*, lxxxii., 1919, 146.

[3] *Op. cit.*, 157. The 'perhaps' seems a little mild.

[4] T. Thunberg, Nagel's *Handbuch d. Physiol. d. Menschen*, iii., 1905, 721.

barte Endorgane des Tastsinns isolirt zu erregen, eine Unterscheidung derselben möglich ist, richtige Versuchsbedingungen vorausgesetzt" (italics ours). A little later they say: "Wir glauben..den Satz aussprechen zu dürfen, dass auf allen Tastflachen, auf welchen eine isolirte Erregung einzelner Tastpunkte gelingt, die Successivschwellen bei günstigen Auffassungsbedingungen den Abständen der Tastpunkte merklich gleichwertig sind."[5] It is clear that von Frey and Metzner are outrunning their facts by inference; but it is clear also that they are careful to distinguish inference from observed fact. Thunberg and Watt speak as if the whole bodily surface, and not the forearm only, had been explored.

We thought it worth while to test the Thunberg-Watt generalization on a part of the body that should be as free as possible from the influence of empiristic motives (visual images, reflexes). For obvious reasons, we chose the back. In a preliminary study the whole back was worked over, in the effort to find an area in which the sensory response of the pressure-spots should be attributively the same. In order that only cutaneous sensations should be aroused, we sprayed the back lightly with ether, and so adjusted the hair-aesthesiometer that, under these conditions, no sensation appeared.

We obtained the most satisfactory results from the area between the scapulae. Over a certain part of this area, moreover, lying on either side of the vertebral column between the seventh and tenth cervical vertebrae,—the part measured 33 to 40 mm. in width above, and 20 to 27 mm. below,—we found that the *Os* could not tell *whether the right or left side of the back was under stimulation*. The pressure of the hair could be roughly localized, but could not be referred to right or left of the vertebral column.[6] This result in itself led us to think that Watt's generalization would prove to be overhasty.

For purposes of tabulation, the inter-scapular area was divided into four sub-areas. The left side of the part wherein the *Os* failed to distinguish right and left we term Area I, the right side Area II. The remainder of the left Area we term Area III, and the remainder of the right area Area IV. For stimulation we had recourse to a modified Benussi kinohapt,[7] controlled by the Leipzig time-sense apparatus set to give an interval of 4/3 sec. between the stimulations; this is the interval recommended by von Frey and Metzner.[8] The duration of stimulation was 0.3 sec. The hair-constants varied for the three *Os*: B, 0.51 gr/mm; D, 0.68; H, 0.42. The current operating the kinohapt was checked several times during an observational period. At the beginning of every hour 16 pressure-spots were selected, two lying vertically and two horizontally in every one of the four areas. We never stimulated neighboring spots, but allowed at least one spot between the members of a pair. The number of spots involved in this way varied from 3 to 38; the number of intermediates was always counted. We made out 20 combinations of the 16 selected spots: vertical and horizontal within every area, and vertical and horizontal in all combinations of the areas.

The *Os* were: Dr. H. G. Bishop (B), instructor in psychology; Dr. K. M. Dallenbach (D), assistant professor of psychology; and Dr. L. B. Hoisington (H), assistant professor of psychology. D and H were highly practised in cutaneous observation; B had not observed before in a similar

[5] M. von Frey und R. Metzner, Die Raumschwelle der Haut bei Successivreizung, *Z. f. Psych.*, xxix., 1902, 173 f.

[6] Dr. Titchener informs us that this experience of the impossibility of right-left localization at a certain place between the shoulder-blades may be had during Swedish massage.

[7] *Arch. f. d. g. Psych.*, xxix., 1913, 385 ff.

[8] *Op. cit.*, 176.

TABLE I

PERCENTAGE OF JUDGMENTS OF 'SAME' IN SERIES I

	Area	I	II	III	IV	I-II	I-III	I-IV	II-III	II-IV	III-IV
Horizontal	B	40	0	20	30	0	0	0	0	0	20
	D	30	30	50	70	0	20	0	0	20	0
	H	60	40	50	10	20	0	0	40	60	0
Vertical	B	10	20	30	20	0	20	0	0	0	0
	D	50	20	40	10	20	0	0	0	20	0
	H	20	30	40	20	40	20	0	0	40	0
Average		35	23.3	38.6	26.6	13.5	10	0	—	33.3	—

TABLE III

TOTAL NUMBER OF STIMULATIONS AND NUMBER OF JUDGMENTS OF 'SAME' FOR SEPARATIONS IN MM.

Separation	0–5	6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45	46–50	51–55
B	13 / 3	28 / 6	12 / 2	10 / 0	30 / 4	15 / 2	11 / 2	5 / 2	4 / 0	5 / 0	1 / 0
D	16 / 8	25 / 10	13 / 4	20 / 6	22 / 5	16 / 1	6 / 0	5 / 0	5 / 0	5 / 0	1 / 0
H	20 / 8	23 / 9	15 / 2	21 / 7	17 / 5	10 / 2	18 / 3	5 / 0	4 / 0	3 / 1	3 / 0
Percent. Same	38	33	20	23	20	12	14	—	0	—	0

experiment. The *Os* were instructed to attend to the cutaneous sensations set up by the stimulus, and to localize them with respect to each other. In the preliminary work the *Os* lay prone, the head resting on a cushion and the kinohapt placed over the back; but breathing led to disturbing movements which were not wholly eliminated even when the breath was held. We then tried placing cushions under chest and abdomen; but still the movements were disturbing. We then seated the *Os* in a chair, with the back supported below the area stimulated; movements were reduced, but even so were not eliminated. Finally we seated the *Os* in a chair with the back supported both above and below the area: this arrangement proved satisfactory.

After completing Series 1, in which two different spots were stimulated in every observation, we undertook a Series 2, in which (within all four areas only) a single spot was twice stimulated; the *Os*, of course, were not informed of the plan of the series. The results of both Series are given in Tables I-IV. Table I shows the percentage of judgments of 'same' in Series 1. Table II shows the same percentage in Series 2. Table III shows the total number of stimulations and the total number of judgments of 'same' for the separations grouped in 5 mm. intervals, together with the percentage of judgments of 'same' for every interval. Table IV shows the total number of stimulations and the total number of judgments of 'same', together with the percentages of judgments of 'same', in terms of the number of pressure-spots involved.

The following are some of the reports:

Series 1. *Same.* B

(1) Localized at the same place; 2 was prick, 1 was weak. (Pressure-spots, 12; separation 26 mm.)

(2) Localized at the same place; 2 was like an after-image. (Pressure-spots, 4; separation, 6 mm.)

(3) Localized in the same area; 1 was large, 2 was small. (Pressure-spots, 4; separation, 5 mm.)

(4) Localized at the same place; 2 was weaker than 1. (Pressure-spots, 4; separation, 7 mm.)

D

(1) Localized at the same place; both were weak and diffuse. (Pressure-spots, 10; separation, 20 mm.)

(2) Localized in the same area; 1 was contact, medium to weak intensity and diffuse, area was size of the thumb; 2 followed immediately, contact, medium to strong intensity, small area. Cannot say whether same or different spots. (Pressure-spots, 12; separation, 16 mm.)

(3) Localized in the same place as two contacts. (Pressure-spots, 8; separation, 13 mm.)

(4) Localized at the same place; same size and intensity. (Pressure-spots, 10; separation, 16 mm).

(5) Localized at the same place; 1 was pressure, 2 was prick. (Pressure-spots, 3; separation, 4 mm.)

TABLE II

PERCENTAGE OF JUDGMENTS OF 'SAME' IN SERIES 2

Area	I	II	III	IV
B	30	70	90	30
D	90	50	60	80
H	20	40	10	20
Average	46.6	53.3	53.3	43.3

TABLE IV

TOTAL NUMBER OF STIMULATIONS AND NUMBER OF JUDGMENTS OF 'SAME' IN TERMS OF PRESSURE SPOTS INVOLVED

Pressure Spots	3	4	5	6	7	8	9	10	11	12
B	13 2	17 4	9 3	4 1	4 0	6 1	5 0	7 1	18 1	9 2
D	11 4	18 7	9 5	3 1	3 0	6 2	10 2	15 6	6 5	7 1
H	13 5	14 5	9 4	6 1	5 2	7 2	10 4	12 3	5 0	5 1
Percent. Same	29.8	32.7	44.5	23.1	—	26.3	24.0	29.4	20.7	19.0

Pressure Spots	13	14	15	16	17	18	19	20	23	26
B	5 0	0 0	3 0	9 2	8 1	2 1	1 0	1 1	3 1	1 0
D	6 0	4 0	6 0	7 0	3 0	6 1	2 0	0 0	0 0	1 0
H	6 0	11 3	4 2	4 0	7 1	3 0	5 2	4 0	3 1	2 1
Percent. Same	0	—	—	—	10.1	18.4	—	—	33.3	—

H

(1) Localized at the same place. (Most of the reports in which there was a judgment of 'same' were given in this way.)
(2) Localized in the same area; 1 was spread down, 2 was spread up. The two were not over each other, but there was no difference in the place touched. (Pressure-spots, 9; separation, 16 mm.)

Series 1. *Different.* B

(1) 2 was 1.5 cm. right of 1; 1 fell down and wabbled around, 2 was pure pressure. (Pressure-spots, 5; separation, 9 mm.)
(2) 2 was 1.5 cm. below and right of 1; same quality, intensity, and extensity. (Pressure-spots, 5; separation, 9 mm.)

D

(1) 1 was neutral pressure, followed by 2 which had the same quality as 1. 2 was first localized in the same area as 1 and then moved diagonally to the left and up ½ in. where it became itch. (Pressure-spots, 8; separation, 13 mm.)
(2) 1 was large; 2 was in the area of 1 and was small, but the centers were not the same. (Pressure-spots, 4; separation, 5 mm.)
(3) 1 was pressure, 2 was prick; the spots were different but don't know separation or direction. (Pressure-spots, 3; separation, 5 mm.)
(4) 2 was at the top edge of 1. (Pressure-spots, 10; separation, 21 mm.)

H

(1) Both touched different edges of the same spot. (Pressure-spots 12; separation, 20 mm.)
(2) 2 was just below 1. The two pressure areas touched. (Pressure-spots, 4; separation, 5 mm.)
(3) 2 was at the right edge of 1; 2 was big and diffuse. (Pressure-spots, 14; separation, 21 mm.)
(4) 2 was at the bottom edge of 1. (Pressure-spots, 10; separation 16 mm.)
(5) Localized in the same area but having different centers. (Pressure-spots, 9; separation, 16 mm.)

Series 2. *Same.* B

(1) The spots piled up on each other.
(2) Localized at the same place. Seemed to be a long *one.*
(3) Both stayed in the same place and wiggled; size and feeling of a small camel's-hair brush.
(4) Localized at the same place; was as though the hair was bent down along the back.

D

(1) Same in quality, extensity and intensity.
(2) Localized in the same place; weak, contact, diffuse.
(3) Localized in the same place; dull diffuse pressure .

H

(1) Localized at the same place.

Series 2. *Different.* B

(1) 2 was below and right of 1.
(2) Spots very close together.

D

(1) 2 was below and left of 1; 1 was neutral pressure, definite localization; 2 was contact, diffuse, not definitely localized.

(2) No definite localization; spots were perceived as different in location and quality.

H

(1) The two areas overlapped but had different centers.

(2) 2 was 1.5 cm. above 1.

(3) 2 was 1 cm. below 1. 2 was spread out and almost touched 1.

We note in Table I that stimulation within a single area gives a large percentage of judgments of 'same', and a larger percentage on the left than on the right side. Stimulation on both sides of the vertebral column (as I-IV, II-III) gives only a very small percentage of 'same'; except in the two central areas (I-II), where we had found in the preliminary work that there is no rightness or leftness, the judgments of 'same' are about half as numerous as those of the single areas. When the areas stimulated lie on the same side of the spine, there is again a large percentage of 'same', but now the right side gives the higher values.

Table II shows that, when we stimulated a single spot twice over, the *O*s reported 'same' in only about 50 per cent of the cases.

Table III shows that the percentage of judgments of 'same' decreases as the separation of the spots increases. We find, however, one judgment of 'same' for a separation of 46-50 mm.

Table IV resembles Table III. The greatest percentage is for 5 pressure-spots, but there is one judgment of 'same' for 26 spots.

Although we tried to secure an attributive identity of the cutaneous sensations, there were of course many occasions when difference was reported. Judgments of 'same' (identical locality) occurred when the sensations were attributively different, and judgments of 'different' (different locality) when the sensations, as reported, were attributively the same.[9]

Conclusions

It is clear that, whatever may be the basis of cutaneous localization (and we have no intention of attempting a theory in the present Study), Watt's generalization, offered in support of his hypothesis of an attributive order, is not valid. "On the skin it is found that every nerve-ending and every touch-spot can be distinguished from every other, with the exception, perhaps, of those that lie too close together to allow of isolated stimulation" —this statement not only, at the time of its printing, went beyond the experimental facts, but is now shown also to be at variance with experimental facts. Different laws hold for different parts of the cutaneous surface. Our results, moreover, obtained as they were on an area as free as possible from the influence of empiristic motives, suggest that localization is in general a matter rather of perception than of sensation.

[9]The phenomenon of movement was reported on several occasions. Cf. von Frey and Metzner, *op. cit.*; V. Benussi, *op. cit.*; J. H. Burtt, *J. E. P.*, ii, 1917, 371 ff.; A. K. Whitchurch, this JOURNAL, xxxii., 1921, 472 ff.

LVI. On the Non-Visual Perception of the Length of Vertically Whipped Rods

By Erna Shults

This study supplements, on one side, the previous work of Hoisington.[1] The former study dealt with the cutaneously determined perception of the length of rods in its simplest form; this study takes up the analysis of the same perception at a more complex level. Here we inquire as to the experience had when *O* whips the rod, rather gently, in the vertical plane. Movement is usually present in our everyday experience with tools and instruments; hence we ask whether the moving stimulus more accurately conditions the perception by way of additional sensory processes or of additional sensory variables, or whether with the moving stimulus any new centrally aroused factors appear which would seem to be essential elements in the perception. The results can tell us nothing about the perception when the end of the moving stimulus-object is in contact with a surface.

The general procedure was the same as that used by Hoisington; *i. e.*, we used five variable stimuli, two above, two below and one equal to the standard stimulus; we used the two time-orders at random but in equal number; we varied the moments of length, weight and center of mass, and the *O* made comparative judgments, always judging the length of the second rod in terms of the first. We reconstructed the apparatus so that it consisted of a rigidly braced wedge-shaped basket which swung from the ceiling. Two arcs, whose radii were the distance from the bottom of the basket to the ceiling, set about 45 cm. apart in the plane of swing, made up the bottom; shallow beds on the upper side of this arc carried the rods which lay horizontally and at right angles to the plane of swing. *E*, by shifting a lever from which a cord passing over silent pulleys ran to the swinging basket, could bring any desired rod immediately in front of *O* and always at the same height; a weight acting over a pulley drew the basket in the opposite direction. This apparatus was to all intents and purposes noiseless.

The *O*s were Miss C. C. Braddock (B), scholar in psychology; S. Feldman (F), assistant in psychology; and L. B. Hoisington (H), assistant professor of psychology. B was a somewhat experienced *O*; F had had very little experience; H was well trained, having observed in the previous work. B and F were completely ignorant of the nature of the problem attacked and of changes made in the stimuli.

The instructions, which the *O*s read from a typewritten copy, were: "You will be given two rods in succession. You will take each in turn and whip it up and down twice. You are to judge the length of the second rod in terms of the first, *i. e.*, you will judge the second as longer than, equal to, or shorter than the first." After some preliminary trials the *O*s agreed that a double whip was the best; it was not long enough to give rise to much reflection or to blot out the previous experience, nor yet too short to give a clear experience. If *O* continued the whip too long, or if he felt unable to make a comparative judgment, *E* presented the pair at some later time in the series.

The serial nature of the work depended upon the different ordering of the three moments; in Series I all three moments (length, weight and center of mass) varied; in Series II length alone varied; in Series III only center of mass varied; and in Series IV only weight varied. The standard rod was 85 cm. long, the variables differed by increments and decrements of 5.5 and 11 cm.; it weighed 100 gr., the variables weighed 2 and 4 gr.

[1] L. B. Hoisington, On the Non-Visual Perception of the Length of Lifted Rods, *Amer. J. Psych.*, 1920, 31, 114-146.

more and less; it had its center of mass 15 cm. out from the front of the handle, the variables had theirs at 6 and 12 mm. farther and nearer. We took 50 comparative judgments for every variable in all series except the first, in which we took 100 judgments. After we had completed the psychophysical work we went through the series again in the same order, but this time *O* reported process in addition to giving his judgment. We hoped, by this complete separation of the quantitative and qualitative parts of the experiment, that *O* would not attend to process during the psychophysical series but would give himself up wholly to the perception. In the early part of the experiment, especially, attention to process makes the judgment less certain if not more variable. There is some evidence, however, that B sought more or less constantly throughout the whole course of the experiment for an existential basis for her judgments; it was as if there were an attempt to justify the one in terms of the other or to correlate across from judgment to process. There can be no doubt either that both B and F confused the factors of weight and length; they did not, apparently, distinguish between the greater absolute intensity of pressure due to weight and the greater relative intensity due to the rod acting as a longer lever in the hand. B, at least, finally overcame the confusion, but not till she came to the introspective part of the work; a fact which may cast some doubt upon the wisdom of the plan of separating the two phases of the work or upon the order in which they came.

Quantitative Results.—The results shown in Table 1[2] are in terms of h' and L' computed according to Urban. The use of these values does not commit us on the question of the limen; it simply takes these measures as indicative of the degree to which a given set of conditions determines the perception. A small h' and a large L' stand for flat or irregular distributions, while a large h' and a small L' go with steeper curves of distribution which have no inversions, at any rate of the first order. E. G. Boring, in an unpublished communication, also suggests this use of h' in cases where the unit of measurement for purposes of correlation is in doubt. We need no more than call attention to the fact that h' and not L' is the measure which marks the steepness of the curve, and that h and L will differ from their primes according to the unit-steps, since the one is the quotient and the other the product of that unit, whatever it is. Although the lack of a known unit of stimulus with which to correlate deprives us of the true h and of the DL, we may, for purposes of comparison, place our five variables at equal intervals along the abscissa, and indicate them simply by the numbers from 1 to 5, when the h's and L's become in so far comparable with their own kind. Such a procedure can stand only as a makeshift in the face of ignorance; the real solution lies in complete analysis or in a new mode of attack in the case of these complexly integrated perceptions.

The psychophysical results show little that is new so far as the relative effectiveness of the three moments as conditions of the perception is concerned. The one outstanding fact brought out in this connection is the greater effectiveness of center of mass with the rods whipped up and down over that found for the bare lifting of the rods. The increments, 6 mm., are about one-half those used by Hoisington.[3] As we shall see presently, the factors of temporal variation and of spread of pressure were important on the experimental side.

The results of H show clearly the importance of center of mass as the determining condition of the perception. It is plain from H's results for Series I and III that differences of weight or of length condition somewhat, although perhaps only secondarily, the perception; it is just as apparent when we take the results for Series II and IV that it is length rather than

[2] See p. 140. [3] *Op. cit.*, 116, Table I, Series AI and BI.

weight which is the conditioning factor, a fact which comes out more clearly in a Study which is to follow. This conclusion does not hold for the other two *Os*, for whom, as we have said, weight played a large part. F, in the introspective series, almost always reported the one or the other of the rods as lighter or heavier than the other; he seemed unable to escape difference of weight even when instructed to judge length or to report process. Hence Series II yields the smallest values for *h'* and Series IV for the judgment 'longer' yields a value greater than the corresponding value for Series III, although their relative as well as their absolute magnitude reverses for the judgment 'shorter' in the same series. The results of B show little that is significant. The largest *h'* occurs for Series II, the largest average is for Series I and the smallest for Series IV, but the differences are not large when compared with the variability found between the results for the judgments 'longer' and 'shorter'. B, in all except Series IV, gives higher values for *h'* with the judgment 'shorter'; F gives the larger values with the judgment 'longer' in all except Series III; and H in all except Series I, where the difference is very slight. These results of F and H agree with those obtained by Hoisington.[4]

Qualitative Results.—A summary of the reports of B for Series I shows that the judgment 'longer' goes with more intense, bulky, massive pressures in the hand which show greater extent; the presence of pressure and strain sensations in the arm with the up-whip; a slower, more constant and greater increase and decrease of intensity of pressure with whipping; a relatively more intense pressure at the back of the hand than at the front and, at first, a considerable amount of visual imagery. The report of experience with the judgment 'shorter' gave, in general, just the opposite. The following reports are typical: (4-3—) "With the first, a bulky pressure at the base of the thumb and in the palm of the hand; the bulkiness greater and pressure more intense in palm. In whipping rod, the pressure seemed to fall back heavily on palm with a steady increase in intensity. Slight sensations of strain along back of hand and in wrist with the lift. With second rod, the same experience but less intense. The pressure was more evenly distributed between palm of hand and thumb. The rod jumped up more easily and gave a more definite pressure on the forefinger." (3-1—) "Lighter pressure in palm, on thumb and forefinger. A more surfacy, more cutaneous pressure with second than with the first. Kinaesthetic sensations in hand with both. Visual image with second of light yellowish, greyish thing which meant rod." (3-5+) "Second heavier, more bulk in hand, a bulkier pressure on thumb. Visual images of a short rod and of a longer and thicker one. Moving pressure in first seemed to come up more quickly; second seemed to be dragged down by something." (3-5+) "Pressure dull heavy on thumb, also pressure in palm and on forefinger. Sudden increase and slow decrease of pressure on finger. First, lighter; moving pressure gave less change in intensity."

F found much difficulty in reporting so complex an experience. At first, it was a matter of weight and of the angle at which the rod dropped down; later, it was a matter of comparison of fore and back pressures; the act of whipping seemed to be an inadequate stimulus for reportable experience. A few reports follow:

(3-5—) "Second heavier. Very heavy at point quite distant from handle. Could not definitely localize end point of second." (3-4+) "First heavier at end; second grew lighter toward the end." (3-5+) "Pressure more intense in second. Pressure in forefinger more intense with second than with first. Proportionately more intense in relation to pressure at base of thumb." (1-3+) "First pressure greater at base of thumb, second

[4] *Op. cit.*, 146.

pressure greater at side of finger." (5-3—) "Pressure on forefinger greater than that at base of thumb in both. Difference between pressures less in the second."

H reported temporal differences both in rate of change of intensity with whipping and in the rapidity with which maxima of intensity, as the rod came down, followed each other; differences in relative and absolute changes in intensity with whipping, with correlated changes in quality; differences in the extent of the pressure pattern, and differences in the relative intensity of the fore and back pressures. With the shorter rods the pressure at the base of the thumb was relatively less intense, and fluctuated more rapidly and through a relatively wider range, passing very quickly from almost zero to maximal intensity; the total pattern while a unity yet showed focal points at the base of the thumb and on the forefinger with little pressure in between (it was often of neutral quality with contact-fringes which gave the impression of liveliness); with the long rods, or those which gave rise to the meaning longer, the fluctuations with whipping were slower in alternation, the intensity increased and decreased more slowly with the maximum maintained for an appreciable time, and the pressure extended over the whole of the inner part of the hand or nearly so, with a dull, draggy, 'dead' quality. The following are sample reports.

(3-2—) "Pressure on forefinger and on base of thumb less intense with the second; the difference was greater in the case of the back pressure. Variations in intensity with whipping relatively greater in second and the shifts were more rapid." (1-3+) "More intense pressure with the second especially at back of hand. Fluctuations slower with relatively slightly less change in intensity. A little more extended pressure pattern with the quality a little duller at moments of greatest intensity."

The reports from Series III add but little to the above; there is perhaps a slight difference in degree. A couple of reports from every *O* will serve. (1-4+) "With the second the whole thing was a bigger experience. Slight strain. Sudden increase with slow decrease. With the first a sudden decrease of intensity" (B). (2-3+) "Pressure at base of thumb and in palm bulkier with second. Also a definite increase in intensity of pressure on the forefinger. It was the way it increased and decreased; as the rod came down it increased very quickly but decreased very slowly" (B). (4-3—) "Pressure greater in first; in second, pressure greater at base of thumb" (F). (3-5—) "Pressure in first greater than in second; pressure in first on forefinger greater than pressure on forefinger in second" (F). (1-4+) "Fore pressure a little more intense and a little duller with the second; back pressure considerably more intense and duller. With second the pressure pattern was more sharply defined in extent and showed greater variation in intensity and a longer interval with whipping" (H). (5-3—) "Both pressures less intense with the second, especially the back pressure. With first a dull pressure fairly sharply defined in extent; second, neutral pressure with a hint of contact. Less change in intensity with whipping than with first" (H).

Series IV yields nothing save differences of absolute intensity of pressures. These differences proved adequate to touch off the meaning of difference of length, although there is no evidence that they in any way conditioned the true perception of length.

In Series II, especially if *O* began the whip rather quickly, the longer rods responded less readily; there was a temporal lag with increase of intensity on the forefinger. This temporal difference in formation and change of pattern gave rise to a perception of difference in length; the difference tended to disappear as the rods got under way and settled to a slow uniform rate of movement. The reports are not entirely unequivocal. (3-1—) "Sensations in wrist; a sort of pushing up of the hand. Increase in intensity but it did not increase as much as I expected it would" (B). (3-2—)

"Lighter pressure with the second. Less subcutaneous and more cutaneous on the forefinger. Slow increase in intensity when the rod came down and quick decrease when the rod went up" (B). (5-3—) "Alternation of pressures quicker with the second than with the first. Less intense pressure with the second" (B). (2-3+) "A heavier pressure on the palm with the second. Slow alternation between the pressure on the finger and that on the thumb which gave the idea that the rod was hard to lift" (B). (3-2—) "First pressure was light and evenly distributed; second pressure at the base of the thumb was lighter" (F). (3-5—) "First pressure greater on the forefinger; second pressure lighter on the thumb" (F). (4-3—) "Pressure with the first was greater; no other difference" (F). (5-3) "With the up whip the pressure was more intense than in the second, but when the rods came down the intensity of the pressures was equal" (H). (2-3) "The immediate impression was one of slightly greater intensity on the forefinger with the second. When whipped the intensity became the same as the first" (H). (3-2) "First impression was 'shorter' but with the whip they became 'equal'. The pressure at the base of the thumb was, at first, weaker with the second but increased with whipping" (H). (3-1—) "The second experience seemed a little more diffuse but a little less extended. I did not notice any difference in intensity. It was more a judgment of inference than one of direct experience" (H).

Conclusions.—We conclude that the perception of the length of vertically whipped rods depends primarily upon the relative intensity of two opposed pressure experiences in the hand.

In addition, the most important items of experience for the perception and those which contribute most to its refinement are the differences in the frequency and rate of intensive changes with the whip.

The perception of difference in length correlates highly with difference in center of mass, and somewhat with difference in length of the stimuli.

LVII. On the Non-Visual Perception of the Length of Horizontally Whipped Rods

By A. S. Baker

In every-day life the tools and instruments which we use move or act for the most part in the vertical plane; moreover, if one gives a rod to a blindfolded subject and asks him to judge its length, he will almost invariably whip it up and down. If, then, the perception is one in which the integration of the processes depends upon past experience, we should expect the perception of the length of a horizontally whipped rod to be less refined, less accurate in terms of stimulus, than that of the vertically whipped rod. On the other hand, since the psychophysical processes have a common origin and no new or lacking moment in the stimulus can be assumed *a priori*, we might expect the perception to be as accurately determined in the one case as in the other; the usual vertical whip being a muscular rather than a perceptual habit.

We did the experimental work for this study during the Summer term of 1921. The general procedure and apparatus were the same as in the preceding study by Shults.[1]

[1]Erna Shults, On the non-visual perception of the length of vertically whipped rods, *Amer. J. Psych.*, xxxiii, 1921, 135 ff.

TABLE I
(SHULTS)

	Obs. B.				Obs. F.				Obs. H.			
	Judgment				Judgment				Judgment			
	Longer		Shorter		Longer		Shorter		Longer		Shorter	
	h′	L′	h′	L′	h′	L′	h′	L′	h′	L′	h′	L′
Series I	.482	.379	.644	.449	.358	.755	.343	.716	1.24	.443	1.26	.395
Series II	.311	.956	.688	.343	.128	1.75	.079	2.08	.286	2.25	.157	2.69
Series III	.338	.997	.384	.540	.314	.920	.408	.205	.653	.762	.651	.501
Series IV	.346	.989	.311	1.12	.323	.936	.251	.780	.111	6.45	.080	5.49

TABLE I
(BAKER)

	Obs. B.				Obs. H.				Obs. K.				Obs. S.			
	Judgment				Judgment				Judgment				Judgment			
	Longer		Shorter		Longer		Shorter		Longer		Shorter		Longer		Shorter	
	h′	L′	h′	L′	h′	L′	h′	L′	h′	L′	h′	L′	h′	L′	h′	L′
Series I	.73	.62	.57	.52	1.3	.69	1.5	.37	.66	.64	.77	.33	.60	.59	.54	.25
Series II	.53	.71	.42	1.0	.42	1.9	.35	1.7	.42	.51	.46	.36	.39	.85	.37	.04
Series III	.44	1.3	.43	.66	.77	.51	.75	.46	.29	.69	.36	.34	.42	.26	.50	.86
Series IV	.18	2.2	.13	2.7	.05	15.	.06	0.7	.59	.38	.71	.43	.39	.26	.46	.51

The observers were Dr. H. G. Bishop (B),, instructor in psychology; Dr. L. B. Hoisington (H), assistant professor of psychology; H. B. Kohlmeyer (K) and C.N. Shlenker (S), juniors in the college of Arts and Sciences who had taken courses in general psychology. B and H were trained *Os*, H especially trained in this kind of observation; K and S were untrained.

The typewritten instructions were: "You will be presented with two rods in succession. You are to take them rather loosely in the hand and, after lifting them a short distance in the vertical plane, whip them back and forth twice in the horizontal plane. You will judge the *length* of the second in terms of the first, that is, you will judge the second as longer than, equal to, or shorter than the first."

The ordering of the stimulus moments resulted in a four-fold division of the experiment; Series I in which all moments varied, Series II in which length alone varied, Series III in which center of mass varied, and Series IV in which weight varied. In the last three series the other moments remained constant for all five stimuli. The standard rod was 85 cm. long, weighed 100 gr. and had its center of mass at 15 cm. out from the front of the handle. The increments and decrements of length were 5.5 and 11 cm., of weight 2 and 4 gr., and of center of mass 6 and 12 mm. In any series in which a given pair of moments were constant they were the same as those for the standard rod.

Quantitative Results.—Table I sums up the quantitative results as expressed in terms of h' and L' computed according to Urban from results got by the method of Constant Stimulus Differences.[2]

Apparently the most characteristic feature of this table is its lack of agreement between *Os* and more especially between the trained and untrained groups. All results agree, however, in that they gave the steepest curves or the largest values for h' in Series I, also that they gave no inversions of the first order for any *O* in this series. The results of B and H agree for Series IV in that they gave the smallest values for h' and both sets of results gave inversions of the first order. In fact, the results of H gave a negative value for L' for the judgment 'longer' as well as for the judgment 'shorter'; he tended to judge the heavy rods as shorter than the lighter ones. The small values of h' for the two trained *Os* show that weight conditioned the perception very little in Series I. The fact that difference in weight alone does not adequately condition the perception may not be accepted as proof that it might not be effective if given together with center of mass or with length. Time did not permit the further fractionation of moments; but Hoisington, in his analysis of the perception of lifted rods, found that weight and center of mass as co-variables gave no better ogive curves than did center of mass as sole variant. How far the two perceptions are analogous in this respect we cannot say. It is very doubtful whether the difference between the values of h' for Series I and III is due in any great measure to the elimination of differences of weight in the stimuli.

The results of H and S agree in that they gave the second largest values of h' for Series III; for S they are not much in excess of the values given in Series IV, for H they are very greatly in excess of those for Series IV and considerably greater than those for Series II. Although the results of B gave larger values of h' in Series II than in Series III for the judgment 'longer', the values for Series III are considerably greater than those for Series IV; the results of K for Series III gave the smallest values of h' for that *O*.

There can be but one conclusion: the *Os* were not doing the same thing, they were not judging under the same attitude. We naturally incline to give greater weight to the results of the practised *Os*. The stimulus factors

[2]For some remarks on this use of the values h' and L' see the preceding Study.

which condition the perception of the length of horizontally whipped rods are center of mass and length; weight touches off the meaning of length, given a length and a center of mass out beyond the hand, without conditioning the real perception of 'out thereness'. This conclusion accords with the results of Hoisington[3] and Shults.

The results of all *O*s gave fair values for h', considerably larger than the values obtained by Shults and very much larger than those obtained by Hoisington, when length was the only variable. This result can not be explained on the ground of different *O*s, for H served in all three experiments. His results in the study by Hoisington gave for Series A V, which was in every way comparable with our Series II, the values of .054 and .046 for h' and of 12.7 and 14.2 for L' for the judgments 'longer' and 'shorter' respectively, and for Series II in the study by Shults the values of .286 and .157 for h' and of 2.25 and 2.69 for L' for the corresponding judgments. This seems due to a fact of inertia: in the present experiment the movement was at right angles to the direction of the force of gravity and, although the weight was the same for the long and the short rods and the center of mass was the same distance out from the hand, the greater extent beyond the center of mass resulted in a different stimulus-effect as *O* suddenly forced the rod into lateral motion. This explanation finds support in the results of H, who discovered that if he began the horizontal whip very slowly he did not perceive any difference in length between two rods for which he had clearly perceived a difference when he whipped them more quickly. Other *O*s, and especially B, remarked the same fact. H, therefore, repeated Series II and began the whip of the rods very slowly. The results gave .33 and .31 as values for h' and 2.0 and 2.1 as values for L' for the 'longer' and 'shorter' judgments respectively.

Qualitative Results.—The introspective reports show that a difference in the experience of *O* resulted when he whipped a long and a short rod; that the difference was in part of the same order as that experienced when the whipped rods showed differences in center of mass; and that it resembled in part those differences experienced with the primary perception of difference in length. The greater the inertia, the greater was the temporal lag and the greater were the pressures localized in the hand; whether the pressure at the back of the hand increased proportionately more than at the fore-finger is a question to which our *O*s did not return a positive answer. According to the principles of the lever we should expect the back pressure to increase relatively more than the fore if the applied power, in the form of inertia, came out along the rod.

B reports, for Series II, as follows. (5-3—) "The striking thing was that the pressures which were heavier, more massive and more intense with the first were lighter and less intense with the second, a light agile kind of pressure." (2-5+) "Condensation or intensification of pressure came up at the end of the swing, particularly at the back. With the second, a sort of intensification of the experience in general. Strain in hand more intense; some pressure in thumb and fingers." H reports: (2-5+) "More intense pressure with whip on the fore-finger and the pressure more widely distributed with the second. Also pressure of weak intensity in wrist and slowness of change in intensity with the second as compared to the first." (5-3—) "Intensity of pressure on fore-finger less with the second. Fluctuation of intensity with whip less with second but with a more rapid rise and fall of the intensity." (3-1—) "The clear difference in the two experiences was the slightly longer duration of the maximum intensity with the whip, a little greater spread of extent and a spatial shift of pressure on the thumb with the first." (5-2—) "Less intense pressure at base of thumb and less pres-

[3]L. B. Hoisington, On the Non-Visual Perception of the Length of Lifted Rods, *Amer. J. Psych.*, 1920, 31, 114-146.

sure in the wrist with the whip in the second. Fluctuations in intensity came more rapidly and the rise and fall of intensity was faster. Less extent with the second." K, who had visual imagery as part of almost every experience, reports: (1-3+) "Not much difference. Second stretched out farther in the field. Grey did not change. Fan larger in the second case. Pressure with first a slight bit less intense than with second." (5-3—) "Very noticeable difference. Pressure more intense with first; everything seemed more intense. Fan farther away, color brightened." S reports: (1-3+) "Pressure on fore-finger and in palm of hand, kind of jerky feeling with whip. Slight pressure in wrist; more intense with second." (5-3—) "Quite a good deal of pressure in wrist and fore-finger; increased intensity with the whip. Vibrations with the second fairly short. Little pressure except with whip, then pressure on little finger and back of hand; pressure shifted with opposite swing."

If we summarize all the reports for this series we find that the absolute intensity of the pressure experience, the amount and rate of intensive change, the rapidity with which the changes take place, the presence or absence of pressure and strain sensations in the hand, wrist and arm, the extent and the shift of localization of the pressure pattern, all serve as cues to give the meaning of difference of length. All these are in addition to the primary experience which carries the meaning of 'out there', viz., the experience of two opposed pressures which stand to each other in certain ratio-limits of intensity. These are additional modalities which enter into the total complex of experience when the rod swings back and forth in the horizontal plane; they modify the meaning of length, without being able, if they stand alone, either to carry the meaning of length, or in any way to originate the perception of length.

We have given first place in our discussion to the factor of differences in the length of the rods, because this evidently is a more important factor under these conditions than it was under the conditions of Hoisington or of Shults, although Shults found it somewhat effective. Difference in weight, as found in the previous Studies, does not condition the perception; under the conditions of the present Study it may and does, with the unpractised *Os*, touch off judgments of length in the same way as has been found by the previous workers in this field. The reports show that the bare increase of intensity of pressure does not enter into the 'length complex' in the same intimate way as do the modes of experience already mentioned.

A few reports from the practised and the unpractised groups will show the difference. (1-4=) "Intensity of pressures a little greater in the second. First, neutral pressure and contact in quality; second, a little more dull, draggy. The intensity of the fore and back pressures relatively equal in the two experiences; the temporal course was the same" (H). (4-2=) "Second much less intense as a whole than the first and a little less dull in quality. Slightly less extended. Temporal course the same" (H). (4-2=) "Pressure largely cutaneous. It was measured in terms of the 'throw' of the two sticks. Rotation in palm the same, which gave the basis for the judgment" (B). (1-4+) "Great difference, like wood and steel. Pressure with first much less intense than with second. Weight of first unnoticed; weight of second seemed 5 times that of first" (K). (5-3—) "First requires more pressure to hold in hand on both palm and fingers" (S).

Center of mass, also as in the previous Studies, stands out as the one moment of the stimulus which conditions the perception more than any other. The elements of experience were the same as in the list given above: more pressure and strain in the arm, wrist and hand; more extended pressures; absolutely greater but relatively less increase in intensity; slower alternation of maximum and minimum pressures; a slower rate of increase and decrease of intensity; more intensive pressures fore and back with the back pressure relatively more intense, and very often a shift in the local-

ization of the back pressure with the longer rods and the reverse with the shorter. The shorter rods pivoted at the back, and all the movement of the rod was forward from this point; the longer ones pivoted at the fore-finger, and the movement was both forward and back of this point.

B as well as K had visual images with almost every experience. At times they approximated to synaesthesia; it was as if the pressure came in visual terms. This makes it a little difficult to exhibit parallel cases from the reports of B. He reports: "Visual sensations of pressure, a sort of synaesthesia. Shifting pressure in hand correlated with visual streaks; as the pressure jumped up in intensity the grey became black." "Pressure sensations in wrist, fore-finger and palm. All these processes fuse somehow, and coupled with the visual experience give the basis for the judgment." "Pressure and visual experience combined again. No difference in visual terms betwen hand and stick. Spread out fan-shape, extended out in terms of visual process. The pressure seemed visible." In all this, however, as in the visual imagery of K, there is no sure evidence that the visual experience is any other than processes which accrue to the pressure experience in the hand and arm, and that it is at all essential to the perception of length cutaneously given.

Conclusions.—We conclude that the perception of the length of horizontally whipped rods is even more accurate than that for vertically whipped rods.

The perception depends primarily upon the presence in experience of two opposed pressures.

The presence, in the complex of experience, of pressures and strains in the arm and hand, of the shift of the pressure pattern in the hand, of differences in temporal formation, in extent and in intensity, all contribute to the perception.

We add that it is unwise to employ untrained observers in the study of a complex experience, when the period of training is necessarily short.

REVIEWS OF BOOKS

Vorlesungen über Psychologie. By OSWALD KUELPE. Herausgegeben von KARL BUEHLER. 1920. Leipzig, S. Hirzel. Pp. viii, 304.

The sudden death of Oswald Külpe, which occurred on the 30th of December, 1915, snatched away in the midst of his productive and highly influential maturity a man whose genial personality had been impressed upon numerous American psychologists who had been privileged to meet him or perchance to study under his direction. Külpe left unsystematized and in some measure incoordinate the programme of investigation into the higher mental processes which he had been directing in his laboratories at Würzburg, Bonn, and Munich during the ten or more preceding years. It was therefore with unusual interest that one learned of the agreement that was speedily reached by certain of his former students to publish the various courses of university lectures which he had offered during the last years of his academic activity. The first of these posthumous works is now before us, and its perusal is a source of great satisfaction to those who knew the man, and who admired his critical acumen and breadth of view.

Yet there is also a sense of disappointment which can not fail to strike deeply in the minds of some, at least, who anticipated a statement, inadequate though it might be, formulating the newer ideas concerning the processes of thought which the steady stream of investigations emanating from the 'Würzburg School' had made desirable. For the lectures now published include no chapter on thought, and Bühler, who has edited the work with scrupulous fidelity to the original notes, tells us in his preface that Külpe had never lectured on this topic.

In the summer of 1909 the present writer found Külpe lecturing in his last semester at Würzburg on *Feeling and Thought*, a supplemental course offered as a complement to the general course in psychology given during the previous term. But even at this time the topic of thought was not reached, and the whole summer's course was taken up with the psychology of feeling. To feeling is devoted the last chapter of the present work, and it constitutes more than one quarter of the entire book.

Taken as a whole, the present lectures with their divisions into chapters and paragraphs follow with surprising fidelity the order, arrangement, and even the content of the lectures on psychology which the present writer heard as a student in 1902. Excepting the greater stress now laid upon functional psychology, and the implicit assumption of contents of thought, the treatment is similar, both in scope and in tone, to that of the course given thirteen years prior to the author's untimely death.

Yet so far as it goes the book is in no wise to be judged fragmentary. The plan is excellent, and the special topics are handled in a thoroughgoing manner. Data derived from a wide range of psychological investigations are marshalled together with a fine sense of objectivity, while the constructive criticism to which each topic is subjected is masterly in its evidence both of keen insight and of detailed knowledge.

At the beginning of each topic a brief paragraph summarizes the contents and conclusions of what follows. It was Külpe's practice to dictate this summary to his hearers before he entered upon a detailed exposition of his subject. There is also much of the personal touch in these lectures which, to those who knew Külpe and have sat under him, will bring back a vivid picture of the man and his method as a teacher. Even the tone of his voice seems to carry over from many of the passages.

The book is divided into five chapters. The first, being introductory, contains sections on the history of psychology, its concept and problem, followed by a discussion of psychological principles, and a study of sources and methods. We are told that psychology deals with the phenomena of experience in so far as they are subjectively determined. But although these phenomena are immediately dependent upon the ego, they are also mediately dependent upon other things, such as a nervous system. Hence, psychology must be regarded as something more than the "immediate experience" of Wundt's tautological definition, while the "intentionality" in which Brentano finds the characteristic of mentality is held to be too narrow a concept, excluding as it does the sensory, affective, and other contents of consciousness. Neither may the experience of psychology be confused with the phenomenology of Husserl; for Husserl is concerned only with explications, whereas psychology deals with factual data.

The second chapter treats of the general facts of mental life, sections being devoted to the waking and dreaming consciousness, hypnosis, the unity of mental life, the span of consciousness, individuality, psychical contents and functions. In this more than in any other chapter of the lectures Külpe touches upon the psychology of thought and the new orientation given his psychology by the investigation of this subject.

While the theory that underlies his treatment of dreams and hypnosis does not greatly vary from that of the lectures of 1902, there is an altered conception of the unity of consciousness. The significance of the *Aufgabe* having entered into the foundation of all unitary tendencies, the conception of a hierarchy of tasks, supraordinate and subordinate, is suggested and in some measure worked out. Upon closer study, the unity of consciousness becomes a multiplicity of tendencies, each unitary in its own way. Thus seven different types of unity are distinguished, the first being the unity of attention. Külpe's doctrine of attention is never clearly expressed in these lectures, and he devotes no section or paragraph to its place in his psychological system. No description is given of the content as affected by attention, though he holds that attention is limited to a few things. It can be fixated on a single content or group of contents, however, for long periods of time. The unitary influence of the attention provides a rank-order of conscious contents, a closer connection of these contents with one another, and a greater continuity of mental life. The monarchical arrangement of contents and the continuity attributable to dominating moments are resultants of attention. But what is attention itself? Presumably an act, with the diverse functions of ordering, connecting, and arranging contents both in continuous series and in monarchical groups.

A second type of conscious unity is to be found in the totalities of coexistence and sequence. Thus, we have fusion of tones, the figures and bodily forms of visual contents, the qualities of contact, and their complications. The unity of thinking that arises from the unity of a definite problem, a certain end and the direction taken by a line of reasoning, furnishes a third type. In all probability the unity of perception, remembrance, and imagination depends largely upon this characteristic of thinking. A fourth type is discerned in the unity of experience conditioned by regular and periodic happenings such as day and night, and the succession of events which repeat themselves daily. Very important is the fifth type, the unity of self: the fact that in some sense I remain the same despite the fluctuations of my experience, and that this unitary self finds its substance in the persistence of bodily sensations and the visual appearance of my person; in the psychical processes of perception, thinking, ideation, feeling, willing; in remembrances that arise from these experiences, and in the capacities which I develop through these recurrent acts and contents. A sixth type is provided by the selective characteristic of emotion: the unitary mood and temperament; and a seventh and last in the unitary direction

of volition. In the lectures of 1902 but four types of unity were distinguished; those attributable to attention, to the frequency and constancy of certain experiences, to the emotions, and to the will. The underlying theory, however, has not been greatly modified or clarified in its systematic aspect.

In considering the span of consciousness, Külpe points out the ambiguity of this problem and the complicated conditions which underly the range of awareness which chances to be under investigation. Attention is but one factor; the excitability of the organism, the nature of the ideas entertained, feelings, volition, and acts of thinking, are all important in determining the range of any moment in experience.

In the earlier lectures there follow at this point several comprehensive sections treating of the degrees of consciousness—sections which serve to introduce a detailed consideration of attention and apperception. The data of attention and the conditions both of attention and of apperception, together with a section on the theory of attention and one on practice, *Einstellung*, habituation and fatigue, are topics that do not appear in the present volume. Instead we have the scheme of the stages of consciousness which resulted from the experimental investigation of Ernst Westphal. Of interest is the comment that sensory definiteness and clearness do not necessarily change with a shift of attention. This point indicates again that attention is regarded by Külpe as an act of mind with diverse functions; it is not limited to the clarification of conscious contents, since a shift of attention does not necessarily make the content previously attended-to obscure.

As for the stages, of consciousness, we have only the report of Westphal's introspective results without a systematic treatment of their implications. First, an object is presented simply without relation to anything else in consciousness, though already it is an object. Secondly, the object is *noted*; a stage which brings no qualitative modification either in definiteness or clearness, but only a direction upon the content. The object is received: "it falls not like a stone into the water, but like a ball into the outstretched hand." At the third stage there is potential knowledge of the object. Its presence becomes an as yet unformulated knowledge about the object, and contains the possibility of naming it. The establishment of actual knowledge is, however, deferred to the fourth and last stage, in which the object is named or "nailed down." This developmental series of stages suggests, with respect to the problem of the span of consciousness, that one must distinguish the span of knowledge, the span of awareness, and the span of mere presence in consciousness; the first two being obviously of narrower range than the last. These stages also have an important bearing upon the unity of consciousness in the sense of the rank-order of contents that assemble themselves in any unitary experience.

The section on Individuality is descriptive and classificatory rather than a systematic treatment of fundamental traits resting upon an instinctive basis; but in the next section, on psychical contents and functions, we find a brief discussion of these two important groupings of psychological data. The contents are characterized as given, ready-made, as it were, to be apprehended as objective complexes, whereas the functions are the activities of the subject which perceives, remembers, cognizes, notes, thinks, loves, hates, hopes, and fears. The close connection of the two gives rise to a variety of attitudes. Although the connection is intimate we approach a dominance of function alone in states of expectancy, and of content alone in many dreams and in the absorption of concentrated effort. It is also evident upon analysis that acts and contents are independently variable, since the same content can be perceived, noted, judged, or otherwise apprehended. Contents may be directly observed, while functions can only be remembered. One can not assume an attitude of hopefulness and at the

same time observe the state of hoping, for the attitude of observation nullifies the attitude of hoping. Yet Külpe insists that functions are equally existential with the contents to which they apply: they are not to be regarded as hypothetical aids to explanation, but as immediately experienced and observed data of consciousness. The operations of the ego upon the contents of consciousness are neither hypothetical nor assumed, but are facts like any other facts. Despite this positive assertion it is difficult to understand how, through the mediation of memory, a satisfactory evidence can be gained of the psychological existence of these mental acts. Since it is admitted that they are probably at times unconscious, may they not always be so? This would in no wise destroy their actuality, though we should perhaps be obliged to admit that we can observe them only in the modifications which they produce in the contents upon which they act. Suggestive as these sections are, they leave much to be desired in the way of amplification, both in respect of pertinent investigation and of systematic theorization.

The chapter on sensation includes sections on quality, intensity, complication and fusion, contrast, and spatial character. One misses a section on time, although duration is mentioned as one of the attributes of sensation and the writer finds that the topic was treated rather fully in the lectures of 1902. The sections which dealt with the analysis of the special senses have been omitted by the editor, apparently because the notes on the sense-organs and the arousal of sensation appeared to be too meagre for publication.

The most striking feature of this chapter is the inclusion of space among the sensations. In his description of the sense of space Külpe refers to its unique quality and its intensity, varying both in direction and in magnitude. The elementary contents of space are single extensities and distances, while the spatial complications give us surfaces, forms, and places. The impressions of space involve the special sense-organs of vision, skin, joint, tendon, and muscle, and there are spatial images of each modality. The difficulties which must be met before one can fully accept this view are then treated with remarkable candor. It is freely admitted that the intimacy of the relation of space and the sensory qualities to which it is attached make it appear more as an attribute than as an independent content. What is the adequate stimulus of space: is it objective space as such? How does it happen that different sense-organs afford the same spatial impression? These questions are not easily set aside; and it is even suggested that the spatial character of experience might be regarded as a product of the primary sensory arousal of certain sense-organs rather than as being itself an immediate sensory datum. Despite these difficulties Külpe thinks it possible to hold that space is sensory, its psychological character resting upon a phenomenological content distinct from the logical space of mathematics or common sense.

The fourth chapter deals with mental images. Though images are similar to sensations, this similarity does not necessarily apply to their order and connection. Indeed, the functional acts of the mind have a far greater influence upon the image than they have upon sensation; hence we find difficulty in placing two images in the same order of intensity or vividness. The brightest light does not blind us when it is imaged, nor is corporeality a positive characteristic of images, save possibly in certain dream-images. Yet we must sharply distinguish the meaning of the image from its phenomenological content; for the reference of a content to its object is never a psychological characteristic of the content itself. The distinction of image and sensation is further complicated by the transitional stages we meet in pseudo-sensations, in memory after-images, and in hallucinations. The distinction is therefore one which is based primarily on the non-psychological conditions of arousal. The sensations were defined as simple contents

arising from the stimulation of sense organs; the images must be different because they are otherwise aroused.

Certain fundamental conceptions are elaborated with respect to arousal. These may be enumerated as: (1) the basis of reproduction in the sensory impression, once made and retained; (2) a general tendency to give back the images of our sensations as ideas; (3) a tendency of perseveration, which favors the reproduction of some impressions more than others; (4) the association of images or bases of reproduction, which favors the reciprocal revival of the one by the other; (5) the tendencies of reproduction which are established by association; (6) the readiness for revival, which may be variously conditioned to occasion: (7) a constellation of ideas with its generative inhibitions and facilitations of imaginal contents.

The fifth and last chapter, on Feeling, is a critique of this concept, together with an evaluation of methods and results. Here again a fine discrimination of the views and the data which have been gathered by various theorists and investigators is more evident than the attempt to give feeling its proper place in a system of psychology. The two criteria which Külpe has advanced for the definition of feeling are its *universality* and its *actuality*. The first is objective in as much as the feelings have no precise anatomical basis, but attach themselves equally to sensations, ideas, and functions. The second criterion, the actuality of feeling, is indicated by the fact that the conditions and laws of reproduction do not obtain for it. Feelings are always original; they are never copies or remembrances of other feelings. While maintaining that pleasantness and unpleasantness are the two elemental qualities of feeling, Külpe proceeds to characterize different affective complexes as they are conditioned by different modes of arousal. These are the stimulus or sensory feelings, the content feelings, and the act or functional feelings. Distinction is also made between active and passive feelings, and between particular and common feelings. The active and passive feelings, differ not in quality but in respect to motor and intellectual accompaniments. Particular and common feelings are likewise of the same quality, but the former attach themselves to parts in a total consciousness, while the latter are all-pervading. Whether a common feeling is the resultant of a multiplicity of stimuli or of the spreading out of one or more particular feelings we do not know.

In summary, Külpe divides consciousness into acts and contents, the latter including sensations, images, thoughts, and feelings. It may be questioned whether he has made his case for the consciousness of mental acts; and he would have been the first to admit the need of a much more detailed analysis, both experimental and theoretical, before the functions of mind can be properly classified and their multiple influences upon the contents of consciousness adequately determined.

His treatment of the contents themselves suffers from this uncertainty regarding the attitudes under which they may be observed and defined. Recognizing as he did the tremendous influence of the functional setting upon the content observed, he seems to have preferred to elaborate upon the conditions which obtain for various types of experience, rather than to attempt a first-hand scrutiny of the phenomena themselves. Thus sensation is defined with reference to the sense-organ stimulated, and the image, though its distinction is maintained, is never clearly marked off from sensation. Feeling in turn is defined by extra-psychological means, and we can only surmise what might have been the definition of the thought content if that topic had been included.

On the whole one must conclude that these lectures were the incomplete expression of a man who was too busily engaged in the direction of a large number of research-problems to find the time in which to systematize his psychology with the precision which he himself was by nature accustomed to demand. The psychology of the higher mental processes which he

did much to establish was a field so large and so intriguing that he felt the necessity of awaiting further investigation before he could commit himself to a systematic account of it. Thus the lectures embrace much that is old, including the entire framework which he had formulated prior to the new orientation which the thought psychology gave him. But to say this is not to criticize either Külpe or his scrupulous editor. While it is doubtful if Külpe himself would have consented to the publication of his lecture-notes as we find them, we may be thankful nevertheless for their appearance, since even in their uneven state they suggest many important problems and many significant points of view. He who reads them sympathetically will discern a multitude of fine observations that will contribute substantially to any serious attempt to construct a psychology adequate to the demands both of our existing knowledge of the subject and of our ever-widening field of research.

Cornell University R. M. OGDEN

Suggestion and Autosuggestion. By CHARLES BAUDOUIN. Translated by N. and C. PAUL. New York, Dodd, Mead and Company, 1921. Pp. 349.

Baudouin is a pupil of Coué, who has been carrying on a large clinic at Nancy since 1910. This book is a theoretical exposition of the basis of Coué's practice, which is *autosuggestion*. The chief obstacle to autosuggestion lies in the fact that, under ordinary conditions, the more we try to concentrate our attention on the idea we need, the more attention tends to waver between this idea and opposing ideas. The man who was told that he would find buried treasure if he could dig without once thinking of a certain tabooed phrase had little chance of success. Thus voluntary autosuggestion reverses itself, according to the law which Baudouin has styled that of reversed effort. Autosuggestion must not begin with an effort of 'will', but by a method of relaxation which brings the 'subconscious' into play. One puts oneself into a restful attitude and tries to think of nothing at all. After a time one repeats to oneself the suggestion one wishes to accept. The preliminary relaxation is the essential thing in autosuggestion as in heterosuggestion. The translators, by the way, have translated the difficult word *'recueillement'* rather unhappily as 'collection'. The ordinary translation 'concentration' would have been quite as good, but 'withdrawal' would perhaps be better, since *'se recueillir'* means not a direction outward of the concentrating powers of attention but a gathering of them inward.—What is the advantage of autosuggestion over heterosuggestion? The two evidently are essentially one in nature: every accepted suggestion from without becomes an autosuggestion. But autosuggestion is free from the hampering suggestion that someone else is necessary to the situation, a freedom that certainly is most desirable.

Children, however, are not allowed the precious privilege of autosuggestion. A chapter on their education presents us with the familiar picture (not often, let us hope, realized in life) of the mother bending over the sleeping child and murmuring suggestions into its ears. We teachers, who give suggestions to the young, pacify our consciences by the comforting thought that they will reject what does not naturally belong to them. We can but be thankful that we, ourselves, were allowed to grow up without ever having lost our normal powers of resistance to our parents.

Vassar College MARGARET FLOY WASHBURN

Elements of Folk Psychology: Outlines of a Psychological History of the Development of Mankind. By WILHELM WUNDT. Authorized translation by E. L. SCHAUB. London, George Allen & Unwin Ltd.; New York, The Macmillan Co. 1921. Pp. xxiii., 532.

It is encouraging, as a sign of the times, that this translation has reached a second printing. The exposition of the *Elemente* is simple;

the book covers an enormous range, and is packed full of ideas; and the general trend of its doctrine is sound. The writing is also singularly fresh; only in the constant recourse to dual division do we note any hint of stereotyping in Wundt's thought. Occasionally, of course, we have a one or a three; but the twos—two reasons, two motives, two factors, two forms, two conditions, two changes, two ideas, two lines of development, two conceptions—confront us on every other page. This tendency is, undoubtedly, much more than a mannerism: one is reminded of the illuminating articles by Karl Groos *über den Aufbau der Systeme* (*Zeits.*, 49 and later), —articles which, to my knowledge, have not yet received the attention they deserve. For the rest, Wundt's style is mature, weighty, assured; and his sentences are interlocked in the characteristic way that makes hard the path of the translator.

The new issue is offered to the public as a 'revised edition', though we are not told where the revision has wrought change or how far it has gone. I do not think that it can have been very thorough. At all events, every single one of the passages that I had marked for correction or query in 1916 remains unchanged in 1921. Even the misprints are left standing. I subjoin (with page-references) a partial list of these passages.

32 For *imititate* read imitate.
38 For *Lewes Morgan, Ancient Humanity*, 1870 read Lewis Morgan, Ancient Society (cf. 152), 1877.
42 (line 5 from bottom) for *polygamy* read polygyny.
75 The Sarasins published their book on the Veddahs in 1891, so that Wundt in 1912 should have dated its appearance "about twenty (not ten) years ago." In any case the *ten* should have been corrected in 1921. So the "sixty to seventy years old" of p. 109 should have been changed, or its date (1912) added. The phrase "some two years ago" on p. 258 does not occur in Wundt's text, 1913, 256.
79 For *Sea of Bengal* read Bay of Bengal.
96 The ring-tailed lemur belongs to Madagascar; the Malayan *kra* is the Macacus cynomolgus.
117 (9 lines from bottom) For *particular* read individual; cf. the use of particular for *bestimmt* on the following page.
124 For *cooking* read boiling.
177 *Boomerang* is either a slip on Wundt's part for bull-roarer, or indicates a faulty memory of Spencer and Gillen. Churingas of boomerang-shape are altogether exceptional.
180 *Aranda* is the German of the English Arunta.
197 For *casual* read causal.
198 *Indo-Germanic*, here and elsewhere, should be Indo-European.
212 For *prepondering* read preponderating.
218 For *Mycenian*, here and elsewhere, read Mycenaean; and for *Mycene* (p. 377) read Mycenae.
223 (line 16 from bottom) For *he* read it.
237 The Polynesian child has to live "several hours" to gain its right to existence; on p. 44 the child has to live "but a single hour."
242 For *Preusz*, here and elsewhere, read Preuss.
249 For *Zuni*, here and elsewhere, read Zuñi.
255 For *Eleusynian* read Eleusinian.
297 For *Opis* read Apis.
325 For *testify* read testifies.
331 For *older members* read other members.
355 Is it worth while to change our familiar phrase "by the oaks of Mamre" to "near the terebinths?"
363 (line 10 from bottom) The punctuation is doubled.
417 For "peoples of the Andes" I should prefer "Andean peoples," since the associations of the word Andes are to South America.

422 (line 17 from bottom) For *it* read is.
449 (line 12 from bottom) For *heterogeny* read heterogony.
465 For *phallephoric* read phallophoric.

Finally, to conclude this list of little things, I note that 'will' and 'would' continually take the place of 'shall' and 'should:' cf. 68, 96, 114, 151, 192, 227, 241, 258, 267, 331, etc.

There are, however, larger things also to be considered; and of these there are two (as Wundt might say) that have specially impressed me. I suggest, first, that it would be well to give the full titles, dates, places of publication and (if these exist) titles and dates of translations, of the books which Wundt mentions casually and characterizes incompletely in the course of his exposition. Wundt's references, which naturally tend to be German, might also be supplemented by a few of our first-rate English books. A selected bibliography would surely be of great aid to the serious student; and if the publishers should object to an extension of the volume, there is a blank page 524 asking to be filled. I suggest, secondly, that in the cases where Wundt trips over a matter of fact—the generalization concerning Australian shields on p. 125 (cf. 299) is a flagrant instance—the translator should try to discover the source of the mistake, and in a footnote should state it and correct it by giving chapter and verse of some more reliable authority. It is impossible that a book of this sort should be errorless, but the errors lie on the surface.

E. B. T.

The Biological Foundations of Belief. By WESLEY RAYMOND WELLS. Boston, Richard C. Badger, 1921. pp. xi., 124.

The author has here brought together five essays, previously published in periodicals, which have as a common theme some aspect of religious belief. The first essay, which points out the "biological utility of religious belief during the course of human experience," gives instances and deductions from history which, if accepted, prove that the human races which have survived owe their survival as well as the institutions of art, industry, science, law and politics to the fact that they possessed some form of religious belief, quite independently of the question whether those beliefs were true or false. The argument leaves us a little uncertain whether belief is the foundation of biology or biology the foundation of belief. Religious belief, we infer, stands as the 'cause' of biological survival, although in a later essay the survival of belief points to its biological basis.

The second essay, which treats of two fallacies, the *pragmatic fallacy* and the *fallacy of false attribution*, is of a higher order and of more concern for the philosophy and psychology of religion. The first of these fallacies is the fallacy of assuming to be true that which carries value or that which works; it is due to the failure to recognize that beliefs which are false may at the same time be of great value. A 'metaphysical' belief, whether true or false, has the same subjective effect or value; if it be a 'scientific' belief and untrue, the objective results will, if one persists in the belief and acts thereon, more than outweigh the subjective, and hence leave a balance on the side of disvalue. No attempt is made to apply in detail this mode of characterizing science.

If the discussion of the *pragmatic fallacy* leads on to questions of the relation of mind and body and perhaps inevitably to an organismic or behavioristic point of view, the *fallacy of false attribution* points to the problem of meaning on the one hand and of adequate stimuli on the other. The meaning which attaches to an experience is neither the experience itself nor the adequate stimulus for the experience, and the attribution of the experience to a supernatural source simply because the experience carries a meaning which points to the supernatural, even in the face of an adequate

physiological explanation, is the common error of mysticism. The mystic steadfastly refuses to define God as the mystical experience; He is "not the experience but the giver of the experience." As the author rightly insists, the experience as experience is a fact wholly independent of what the experience means. The full comprehension and avoidance of these two errors should clear up much confusion and obviate common errors in metaphysical thought; not, again, that 'metaphysical' beliefs must be true to have value or to survive; on the contrary, their value and survival power are independent of their truth or falsity.

We may, as we saw above, differentiate 'scientific' and 'metaphysical' beliefs since the one does and the other does not have objective effects. In a similar manner we may differentiate religious values from those of the other value-disciplines on the basis of "the objects to which they are said to attach." Having thus isolated religious values the author offers a classification of them "which will make clearer what would be an objective, behavioristic account of religious values. "It is a classification logically developed and concretely applied.

But beliefs are modes of response or organic attitudes, either positive or negative and, although truth does not, properly speaking, attach to beliefs, but only to propositions, we may call a belief true or false when the response accords with the truth or falsity of the proposition responded to. Add to this the further statement that the instinctive-emotional nature of man determines the response, and you have one of the primary bases for the biological foundation of belief. The instincts, however, singly or in integrated complexes, pure or defiled by accumulations from experience (if they are anything other than the objective responses) are not religion: religion requires in addition "a belief as to the reality of some more or less supernatural object or objects about which these instincts are united into a religious complex." We thought that "belief consists either of an actual response or of an organic attitude." Here is surely definition from two different points of view. The author proceeds: "But, without such instincts *as driving forces* (italics ours) in human life, religious belief would not exist among men." What, then, is an instinct? and what is a belief? We are not greatly helped by the statement that "so far as questions of positivity and negativity in the behavioristic sense, and truth and falsity in the logical sense are concerned, belief and judgment are practically interchangeable."

The second argument in favor of a biological foundation of belief is the survival value, the almost universality, the permanency through change, the self-evident nature of certain beliefs. This could be, so the argument goes, only on the hypothesis of a biological foundation. The adoption of the behavioristic point of view makes such an evolutionary basis defensible.

The concluding essay presents in general outline the principles which should obtain in religious and moral education. The system rests almost entirely on the doctrines of recapitulation and of sublimation, although the latter doctrine supposes the former as a basis.

L. B. HOISINGTON

Psychology for Normal Schools. By L. A. AVERILL. New York, Houghton Mifflin Company, 1921. Pp. xx, 362. $2.25.

In this book the prospective teacher is told what instinctive behavior is natural to the child, and what emotions are when emotion is regarded as a phase of instinctive behavior. Sensation, perception, attention, memory, imagination, thought are all presented as activities or as reactions to external stimuli. The reader is encouraged to look for manifestations of these activities in the child, and instances of their normal occurrence are cited. So

far the author is consistent with the general purpose of the book, to present a psychology of childhood; but a discussion of heredity, which he now introduces, seems to be beside the point, because it does not add to the store of knowledge about the behavior of children to know that they have probably not inherited their parents' acquired characters. If we read beneath the surface, however, we find that the unexpressed mission of the book is to plead for the educational and moral welfare of children, which welfare is to be obtained by means of a thorough and sympathetic knowledge of children and by control of their heredity. Besides the straightforward account of behavior to which we have referred, other material is added to extend the prospective teacher's knowledge of the nature of the child. There are chapters dealing with the exceptionally bright and the exceptionally dull child; with psycho-neuroses and the unstable nervous system; with the delinquent child; and with the period of adolescence. These are followed by the final chapter on the "evolution of the social attitude toward children." It is this chapter which indicates most conclusively that the author desires to do more than write a psychological account of childhood.

Such a book is not strictly a psychology of childhood; but it is a faithful account, in very elementary terms, of the topics with which it deals. It is so elementary that it tells but little of behavior that any observing eldest child in a family has not noted for himself. Since, however, it is intended for pupils in normal schools who have just completed high-school, perhaps its simplicity is not too extreme.

H. G. Bishop

NOTES

BENNO ERDMANN

Professor of Philosophy at the University of Berlin, and member of the Berlin Academy of Sciences, Geh. Reg.-Rat. Benno Erdmann died from an embolism on January 7, 1921, in his seventieth year. For two years his weakened heart had been a source of inconvenience, making the daily trips between the University of Berlin and his home in Grosslichterfelde an increased burden. Yet he remained in active service almost to the last, working with his accustomed zeal to within three days of his death.

Many Americans have felt the spell of his incomparable lectures. Not a few were trained simultaneously in the philosophical disciplines, in the methods of productive scholarship, and in the art of university instruction in his seminars. These latter have all felt something of the charm of his wise and infinitely patient friendship. Those who knew him in his lectures and his seminars will think of him first, I believe, as a great teacher. He lectured without notes. Yet the perfect form of his utterance made it comparatively easy for those who were still struggling with the German language to follow and understand. The logical sequence of his thought gave his lectures a naturalness and inevitableness that I have never heard equaled. They seemed unforgettable. The complete mastery of his material, his candor, enthusiasm, and magnetism combined to fill the larger lecture rooms, whether he lectured on Psychology, Logic, the History of Philosophy, or Education.

It was, however, in his seminars that we got our real insight into the extent and accuracy of his scholarship, our inspiration to productive thinking, and our training. The limitations of the lecture irked him. It offered no opportunity for real contact with the minds to which he spoke. He seemed to envy the relative informality of American class-rooms. It was in the freedom of the seminar that he brought out the best that was in each one of us to meet the great problems of life and thought. How often have I gone back to my room full to bursting with enthusiasm for solving the apparently all-important problems that we had just gathered the relevant data for understanding!

But of all those who called him teacher and friend I believe that I have most to be grateful for. It was a seminar problem in the technique of investigating the psychology of reading that started it. For more than two years we worked together almost every week-day for one or two hours in the diminutive Psychological Institute or at his home. It was in those hours of tireless work that I learned the sacredness of an experimental fact, the high obligations of a scientist, and the demands of scientific evidence. Few modern students have had the privilege of observing so intimately the operations of the mind of a master attacking a scientific problem.

Though he visited America once, to participate in the scientific discussions of the St. Louis Exposition, most American students knew Professor Erdmann only through his writings. They knew him consequently only as an accurate and profound scholar. It seems to me that scientific style never more completely hid the charm of personality than his. His first well-known, and probably still his best-known works in America were his studies of Kant's *Kritizismus*, and his edition of Kant's *Reflectionen* and *Kritik der reinen Vernunft*. It was these that took me to Halle. In

recent years one finds frequent reference to his *Logik*, the *Psychologische Untersuchungen über das Lesen*, and his reformulation of G. E. Erdmann's *Geschichte der Philosophie*. The latter was regarded by him as a work of *Pietät*, an interruption of his main tasks, though he was peculiarly fitted by temperament and training for its successful execution.

To an unusual degree he followed through, and embodied in his published works, his concept of philosophy as the universal scientific conditions of reality. Before his death he had completed most of the separate investigations that seemed to belong to the whole. Only the second part of his *Logik* is conspicuously lacking. That probably exists in manuscript and, as many of us hope, may yet appear.

At the center of his scientific interests stood a psychologically conditioned epistemology. His historical studies of the conditions and inner development of the Critical Philosophy of Kant, his *Logik*, the St. Louis lecture on the causal problem, and the numerous studies of the thought-processes and their interrelation with language, including our study of reading, appear in retrospect as successive steps in the intensive study of the various phases of a central problem, whose presentation in a single unit was never published if it was ever written. I think he feared the psychological dangers of system-building. The nearest approach to a unitary presentation appears in his *Wissenschaftliche Hypothesen über Leib und Seele*. It may be classified as a thoroughgoing phenomenalistic parallelism.

Aside from the works already mentioned, one should include in the list of constructive special studies his too little known *Zur Theorie der Apperception*, the *Zur Theorie der Beobachtung*, *Die psychologischen Grundlagen der Beziehungen zwischen Sprechen und Denken*, all three published in the *Archiv für systematische Philosophie*; the *Umrisse zur Psychologie des Denkens* in Sigwart's *Festschrift*; and the recent *Grundzüge der Reproduktionspsychologie*.

A bibliography of his numerous papers, *Festreden*, and editorial work lies beyond the scope of the present notice. But it would be materially incomplete if it failed to give a glimpse of the wonderfully kind, great-hearted, unaffected personality that bound his pupils with ties of deepest affection. Though his guest both in Bonn and in Berlin, I knew him most intimately in Halle. There he permitted me to accompany him on some of his errands of mercy that I suppose were utterly unsuspected by any of his colleagues, unless possibly by the inseparable Breslauer group, Pischel and Eduard Meyer. His personal interest in the members of his seminars and their affairs was evidenced by innumerable incidents. The American stranger found a real home open to him, and a real home-welcome, in which the entire family participated. Three Christmas Eves I was invited to the sacred family festival, not as an onlooker but as participant, with my own little table of gifts, *Wurst*, and Christmas cake. I shall never forget the beauty of his face as the pungent odour of spruce needles, fired by the artful placing of the candles, revived memories of his childhood as only odours can. A revelation of his interest in my physical welfare came one unforgettable Easter when he decided that his laboratory assistant was over-fatigued, and led him into the Harz mountains, quietly regulating the stopping-places by his knowledge of my meagre resources. It was a strange coincidence that I broke the long and mutually painful silence which was necessitated by the war on January 7th, the day he died. Perhaps the finest indication of his personality and of his practical philosophy was the tender and profoundly significant question that he asked his wife only a few hours before his death: "Knowest thou how to distinguish between the physiological and the psychological?"

RAYMOND DODGE

Wesleyan University

FESTSCHRIFT FOR CARL STUMPF

Professor Stumpf's pupils presented him, on his seventieth birthday, April 21, 1918, with a manuscript *Festschrift*. Since it was found impossible to publish the work as a volume, the articles composing it are distributed in the technical journals. We have noted the following contributions.

(1) K. Koffka, Zur Theorie einfachster gesehener Bewegungen: ein physiologisch-mathematischer Versuch (*Zeits. f. Psych.*, lxxxii., 1919, 257 ff.). Attempts, on the basis of Wertheimer's physiological theory of seen movement, to translate Korte's laws into mathematical terms.

(2) A. Gelb, Ueber den Wegfall der Wahrnehmung von 'Oberflächenfarben' (*ibid.*, lxxxiv., 1920, 193 ff.; enlarged in publication). Describes cases of brain-injury which have led to the loss of surface colors. Since the object-consciousness is intact, the remaining film-colors maintain their color-constancy as *Sehdinge*.

(3) H. Friedländer, Ueber Gewichtstäuschungen (*ibid.*, 258 ff.). Illusions due to material are based on the idea of expectation, illusions due to volume on this and on the influence of density. The 'idea of expectation' involves a complex play of the associative mechanism, and may work by way of positive suggestion as well as by contrast.

(4) N. Ach, Zur Psychologie der Amputierten: ein Beitrag zur praktischen Psychologie (*Arch. f. d. ges. Psych.*, xl., 1920, 89 ff.). Discusses the mental state and the psychological treatment of the patient; the choice and use of the prosthesis; and the education of the will to work.

(5) O. Lipmann, Die psychische Eignung der Funkentelegraphisten: Programm einer analytischen Prüfungsmethode und Bericht über eine Experimentaluntersuchung (*Zeits. f. angew. Psych.*, xv., 1919, 301 ff.). Analyses the work of the operator into its psychical part-functions; receiving is a more complicated matter than sending. Describes a test-apparatus, whereby the work of the receiver is reproduced in simpler form and under measurable conditions. Outlines two methods of evaluating the results.

(6) O. Abraham, Zur Akustik des Knalles (*Annalen der Physik*, 4te Folge, lx., 1919, 55 ff.). Explains the noise (pop) accompanying very brief siren-tones or noises as due to the formation of a single larger wave which includes the whole number of vibrations in a new physical unit.—

Professor N. Ach of Koenigsberg has been good enough to complete the list, as follows:

(7) A. Guttman, Beobachtungen und Erfahrungen über Intonation (*Beiträge zur Anatomie, Physiologie, Pathologie, Therapie des Ohres, der Nase und des Halses*, herausg. von Passow und Schäfer, xv., 1920, 81ff.).

(8) E. M. von Hornborstel, Ch' ao-t'ien-tze: eine chinesische Notation und ihre Ausführungen (*Arch. f. Musikwissensch.*, i., 1919, 477 ff.).

(9) G. Schünemann, Kasan-tatarische Lieder (*ibid.*, 499 ff.).

(10) M. Wertheimer, Ueber Schlussprozesse im produktiven Denken, Berlin and Leipzig, 1920.

The remaining contributions to the *Festschrift* were unpublished at the time of Professor Ach's communication:

(11) K. Lewin, Psychologische und sinnespsychologische Begriffsbildung.

(12) D. Passau, Die Gefühlslehre bei Joh. Nik. Tetens.

(13) O. Pfungst, Zur Psychologie der Sanitätshunde.

(14) J. B. Rieffert, Ueber das Verhältnis der funktionspsychologischen zur reproduktionspsychologischen Psychologie.

(15) H. Rupp, Die Gedächtnisfarben und analoge Erscheinungen verschiedener Sinne.

E. B. T.

THE EDINBURGH MEETING OF THE BRITISH ASSOCIATION

The British Association for the Advancement of Science held its eighty-ninth annual meeting at Edinburgh from September the 7th to September the 14th, 1921. For the first time Psychology had an independent section. The President of this section, Professor C. Lloyd Morgan, acted as Chairman throughout the meeting. At all times there was a large and interested audience. In fact, I understand that the Psychological Section was one of the most largely attended. Many more non-scientific members attend the British Association than is the case with the American Association. The former Association offers numerous opportunities for the members to see the surrounding country and points of interest. Many laymen, therefore, come from a long distance and intersperse their holiday activities with educational pursuits. The twenty or thirty scientific psychologists present at the meeting seemed like a very small group in comparison with the semi-popular audience. The speakers undoubtedly suited the style of their papers somewhat to the interests of their hearers. For the most part the papers were very general. Only two of them could be classed as reports of experimental work, and one of these was in the applied field. There were in all sixteen papers, beside two symposiums and the presidential address, of which eight were upon applied subjects and eight upon fundamental problems. That is, half of the papers were in the applied field. Even these figures, however, do not give an adequate idea of the great interest in applied psychology in England at the present time. This interest was shown still more clearly by the response of the audience during the discussions. The wave of application seems at present so engulfing and so many of the good men are being drawn into that field that an experimentalist at the meetings could not help feeling some apprehension.

Beside this tendency toward applied psychology and the very general nature of the papers three points impressed me: the influence that Freud has had upon British psychology, the style of the papers, and the nature of the discussions. The frequency with which reference is made to Freud is indicated in the following description of the papers. The distinguishing feature in the style was the fact that, in many instances, the articles were written in essay-form with attempts to please the audience by well-turned phrases and appropriate epigrams. One might wish for more substance, but perhaps it is impossible to hope for more details at such a semi-scientific assembly. There were only four papers at one session, and this arrangement left sufficient time for discussion, which was encouraged by Dr. Morgan who spoke a few words of friendly praise interspersed with criticism after each paper. At times the discussion became very sharp and remarks were made which would have aroused lasting enmity in America. But the British do not seem to consider remarks made upon the platform to be personal. It appears that the spirit of political campaigns has been carried over to the scientific meetings.

The presidential address was upon "Consciousness and the Unconscious." Dr. Morgan explained his 'emergence' theory of consciousness and dealt with the criteria of consciousness on the lines of what he conceived to be its evolutionary genesis. Essential to consciousness is a memory of the past or "againness" and expectancy or "comingness". I understand Dr. Morgan is writing a book on the subject which is to be finished by spring.

"Vocational Training" was discussed at a joint meeting of the psychological, educational and economic sections. Dr. C. W. Kimmins, Chief Inspector of the Educational Department of the London County Council, advocated the use of intelligence-tests in the selection of defective children for special schools and in the awarding of scolarships. He also referred to the value of vocational tests in schools. Mr. D. Kennedy Fraser, Lecturer

in Education, Edinburgh University, thought that vocational education was needed in order to train the large number of children who were misfits in a uniformly difficult curriculum. Dr. C. S. Myers, Lecturer in Experimental Psychology, Cambridge, suggested that cinematograph films be used in the schools in order to acquaint the children with the various forms of occupation, and that such exhibitions be accompanied by lectures upon the duties, responsibilities, dangers and prospects of the various occupations. Mr. F. Watts, Stockport, criticized the use of vocational tests in the present state of society. He considered that industry should be brought into vital contact with the schools. Sir William Beveridge, Director, London School of Economics, said there were three distinct economic consequences in connection with vocational selection: unemployment would be diminished, people would stick to their jobs longer, and production would be increased. Miss L. Grier, Cambridge, referred to problems concerning the women in industry, and advised giving vocational training in schools, factories or special institutions. Judging from this discussion, from the criticisms which followed from the floor, and from other papers at the meeting, it would seem that, although the British psychologists are acquainted with the literature of the subject, applied psychology is at about the stage of development that it reached in America five years ago.

The second symposium, which took place at a combined meeting of the Zoology and Psychology sections, was upon "Instinctive Behavior." Dr. J. Drever said that behavior, even in the lower animals, involves a psychical factor which can not be explained in physical terms and which has to be considered in an adequate scientific account of instincts. Professor E. S. Goodrich, although admitting that there is no fast line between instinctive and intelligent behavior, accepted plasticity as a criterion of intelligence. Professor Arthur Thompson presented a diagram of the different grades of instinctive behavior. He described the difference between instinctive behavior that occurs in one continued series of relexes and that form which consists of an interrupted chain of activities. In instinctive behavior, which is persisted in despite interruptions and difficulties, one should look for psychical factors. Professor Lloyd Morgan, in opening the discussion which followed the papers, said that, according to his belief, there is no intelligent, rational behavior that has not its instinctive basis. Dr. Chalmers Mitchell made a violent attack upon all the speakers for accepting a factor like consciousness or intelligence before they had exhausted the other factors. As will be seen from the above, old ground was plowed over, but not very fruitful soil was uncovered.

Professor T. H. Pear, Manchester University, in his paper upon "A Neglected Aspect of Forgetting," gave a classification of the different types of forgotten memories. He emphasized particularly those memories which are forcibly barred from the personality. He said that inasmuch as there seems to be a close relation between sentiment and complexes, repression is an important factor in sentiments.

Dr. J. Drever, in his paper upon "Appetition and Reaction," introduced Freud's distinction between the pleasure-principle and reality-principle. We have appetition when agreeable experiences are sought and disagreeable experiences are shunned with reference to no end beyond the affective. We have reaction when the action is determined with reference to an external object or end, independent of any affective factor. This distinction is similar to that of Freud. On the other hand Freud apparently considers appetition more primitive than reaction. Dr. Drever believes the safest view for the psychologist to take is that probably both are equally primitive.

Dr. W. Brown, Cambridge, presented a long paper upon "Psycho-analysis and Suggestion." The starting point of his discussion was Freud's assertion that suggestion is a form of transference. The paper for the most

part consisted of descriptions of shell-shock cases and other forms of neurosis. Dr. R. G. Gordon, who seemed to be in close touch with American psychology, presented "Some Suggestions as to a Common Ground between Freudian and Behavioristic Psychology." Miss E. L. G. Ross's paper was upon "The Estimation of Vocational Fitness Among Mental Defectives." About fifty institutional cases were taken as subjects, and their standing in the tests was compared with their industrial ability and learning capacity. Temperamental factors were studied on the basis of the Porteus Social Rating Scale.

Dr. A. R. Abelson presented "A Plea for the Psychological Treatment of the Delinquent Child." Mr. F. Watts, in discussing the "Present Conditions of Industrial Psychology," said that it is not enough to analyze and systematize mechanical operations in industry. Industrial conditions will have to be made to appeal to the fundamental instincts of man. The writer was critical of some of the work which has been done in industrial psychology.

Dr. C. S. Myers described the "Evolution of Feeling." He distinguished four varieties of affective tone: strain and relaxation in response to a favorable situation, and strain and relaxation in response to one unfavorable. Affective tone is due to the organic harmony or discord induced by the environment. Instincts are integrated from different higher and lower reflexes, emotions from different instincts, and sentiments from different emotions. Instincts, emotions and sentiments are accompanied by their special feelings.

Dr. H. S. Langfeld presented a paper upon "The Study of Personality." He emphasized the advantage of coordinating the laboratory work, and showed the possibility of correlating individual differences from the various experiments with the result of the tests and ratings obtained in an experimental study of personality.

Miss E. M. Bickersteff described the results of an extensive research made upon "Colored Thinking" among the school-children of a number of schools throughout the British Isles. She found a surprising number of cases of chromaesthesia. The percentage of colored thinking in certain districts rose as high as 80%.

Mr. J. C. Flugel, University of London, in his account of "Social Progress and Psychological Understanding," presented a diagram showing the various lines of progress in industrial, educational, medical and criminological psychology and in the knowledge of the general public.

Miss F. McFarlane gave a detailed account of an experiment upon "Sex Differences in Tests of Constructive Ability." Boys scored much better than girls in the task of fitting together a sectional wheelbarrow. Further tests were planned to determine if this superiority could be explained by the relation of the object to existing interests.

Dr. C. W. Kimmins, in his paper upon "An Investigation of the Sense of Humour in School Children," showed that the greatest changes in the sense of humour are associated with periods of rapid growth.

Dr. W. H. R. Rivers spoke upon "The Instinct of Acquisition," Mr. J. G. Taylor upon "The Use of Retinal Rivalry for a Test of Colour Fatigue," and Mr. F. B. Kirkman upon "The Psychological Difficulties of a Naturalist."

The British Association expects to meet in Toronto in September, 1924. This would seem to be an excellent opportunity for a joint meeting of British and American psychologists.

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